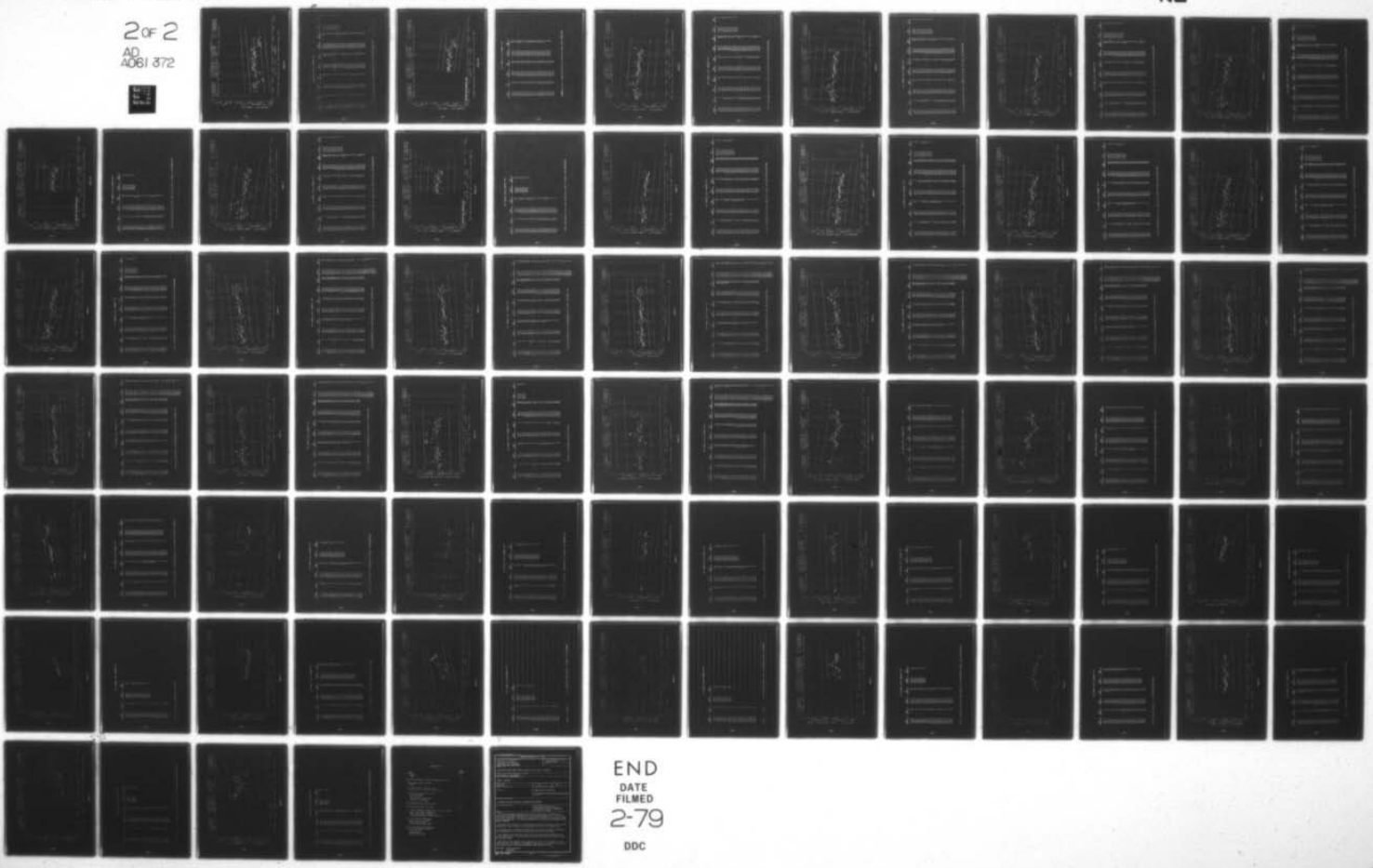
AD-A061 372 OGDEN AIR LOGISTICS CENTER HILL AFB UTAH PROPELLANT L--ETC F/G 21/9.2
PROPELLANT SURVEILLANCE REPORT. LGM-30 A AND B STAGE I, TP-H101--ETC(U)
SEP 75 J A THOMPSON

UNCLASSIFIED MANCP-328(75) NL

2 OF 2
AD
A061 372



END
DATE
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2-79
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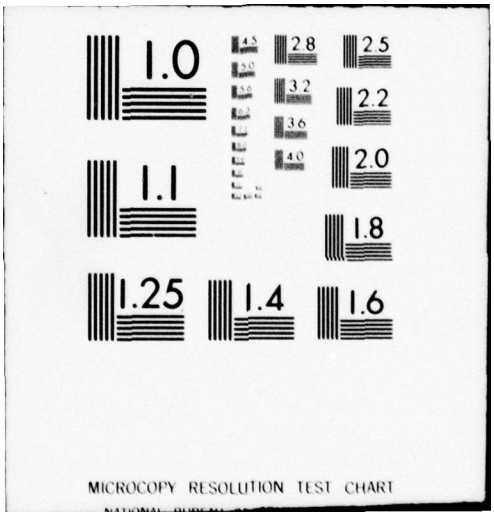

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART

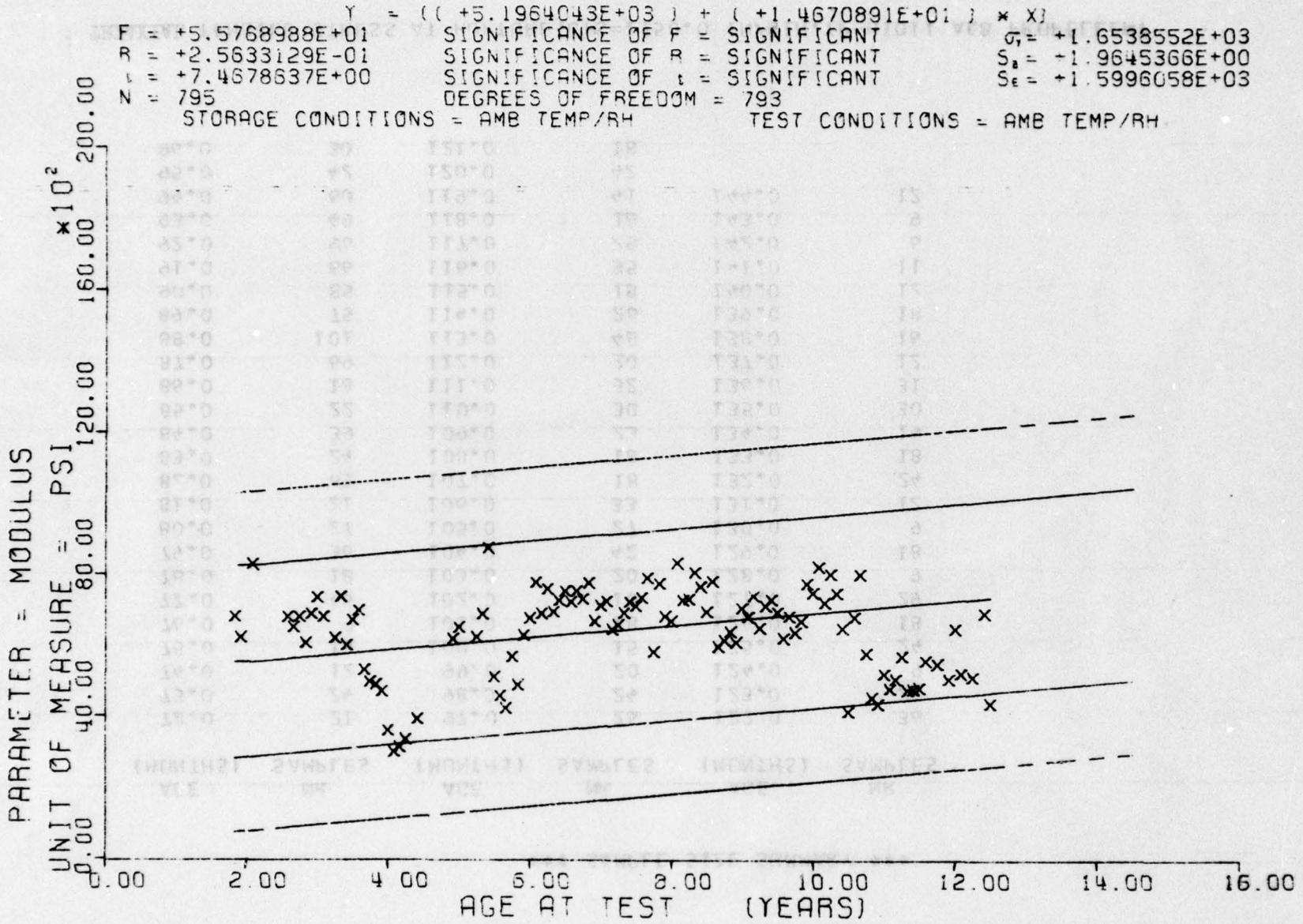
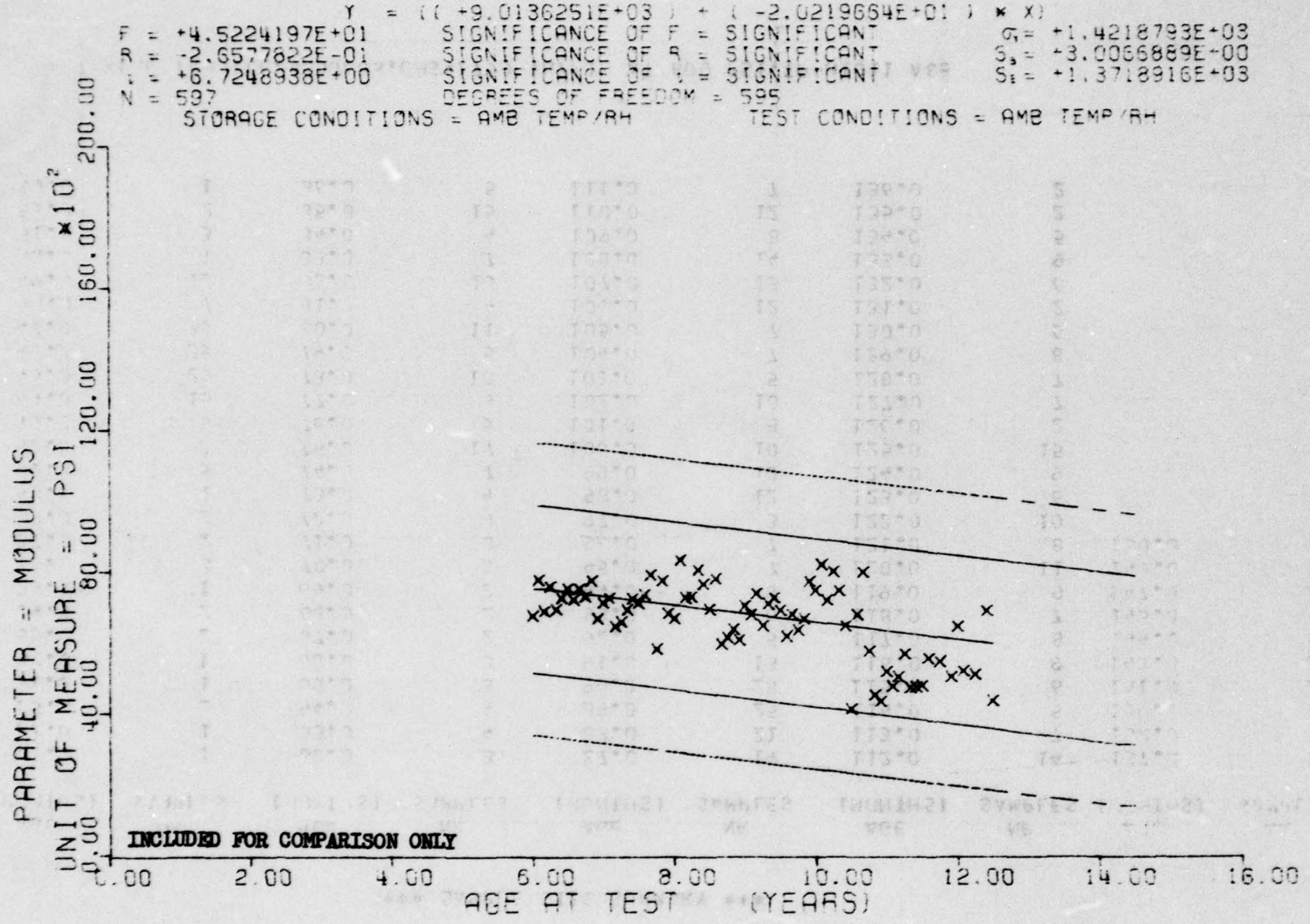

Y = ((+5.1964043E+03) + (+1.4670891E+01) * X)
F = +5.5768988E+01
SIGNIFICANCE OF F = SIGNIFICANT
σ' = +1.6538552E+03
R = +2.5633129E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sa = +1.9645366E+00
t = +7.4678637E+00
SIGNIFICANCE OF t = SIGNIFICANT
Se = +1.5996058E+03
N = 795
DEGREES OF FREEDOM = 793
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
*10²
200.00
160.00
120.00
80.00
40.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE, MODULUS, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B

Figure 25

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	1	50.0	3	87.0	14	112.0	14	137.0	1
[illegible]	1	53.0	4	88.0	21	113.0	7	[illegible]	[illegible]
[illegible]	[illegible]	54.0	4	89.0	25	114.0	5	[illegible]	[illegible]
[illegible]	1	55.0	3	90.0	28	115.0	6	[illegible]	[illegible]
[illegible]	1	56.0	3	91.0	13	116.0	9	[illegible]	[illegible]
[illegible]	[illegible]	57.0	2	92.0	5	117.0	8	[illegible]	[illegible]
[illegible]	2	58.0	2	93.0	6	118.0	7	[illegible]	[illegible]
[illegible]	1	59.0	2	94.0	8	119.0	9	[illegible]	[illegible]
[illegible]	[illegible]	70.0	[illegible]	95.0	7	120.0	11	[illegible]	[illegible]
[illegible]	[illegible]	71.0	[illegible]	96.0	7	121.0	8	[illegible]	[illegible]
[illegible]	[illegible]	72.0	[illegible]	97.0	3	122.0	10		
[illegible]	1	73.0	4	98.0	12	123.0	6		
[illegible]	[illegible]	74.0	[illegible]	99.0	10	124.0	9		
[illegible]	[illegible]	75.0	17	100.0	10	125.0	15		
[illegible]	[illegible]	76.0	[illegible]	101.0	8	126.0	2		
[illegible]	15	77.0	[illegible]	102.0	10	127.0	7		
[illegible]	29	78.0	10	103.0	5	128.0	7		
[illegible]	25	79.0	[illegible]	104.0	7	129.0	8		
[illegible]	[illegible]	80.0	11	105.0	7	130.0	5		
[illegible]	[illegible]	81.0	4	106.0	12	131.0	2		
[illegible]	12	82.0	15	107.0	13	132.0	6		
[illegible]	[illegible]	83.0	[illegible]	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
[illegible]	2	85.0	15	110.0	12	135.0	2		
[illegible]	1	86.0	5	111.0	7	136.0	2		

[illegible] TENSILE, MODULUS, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B



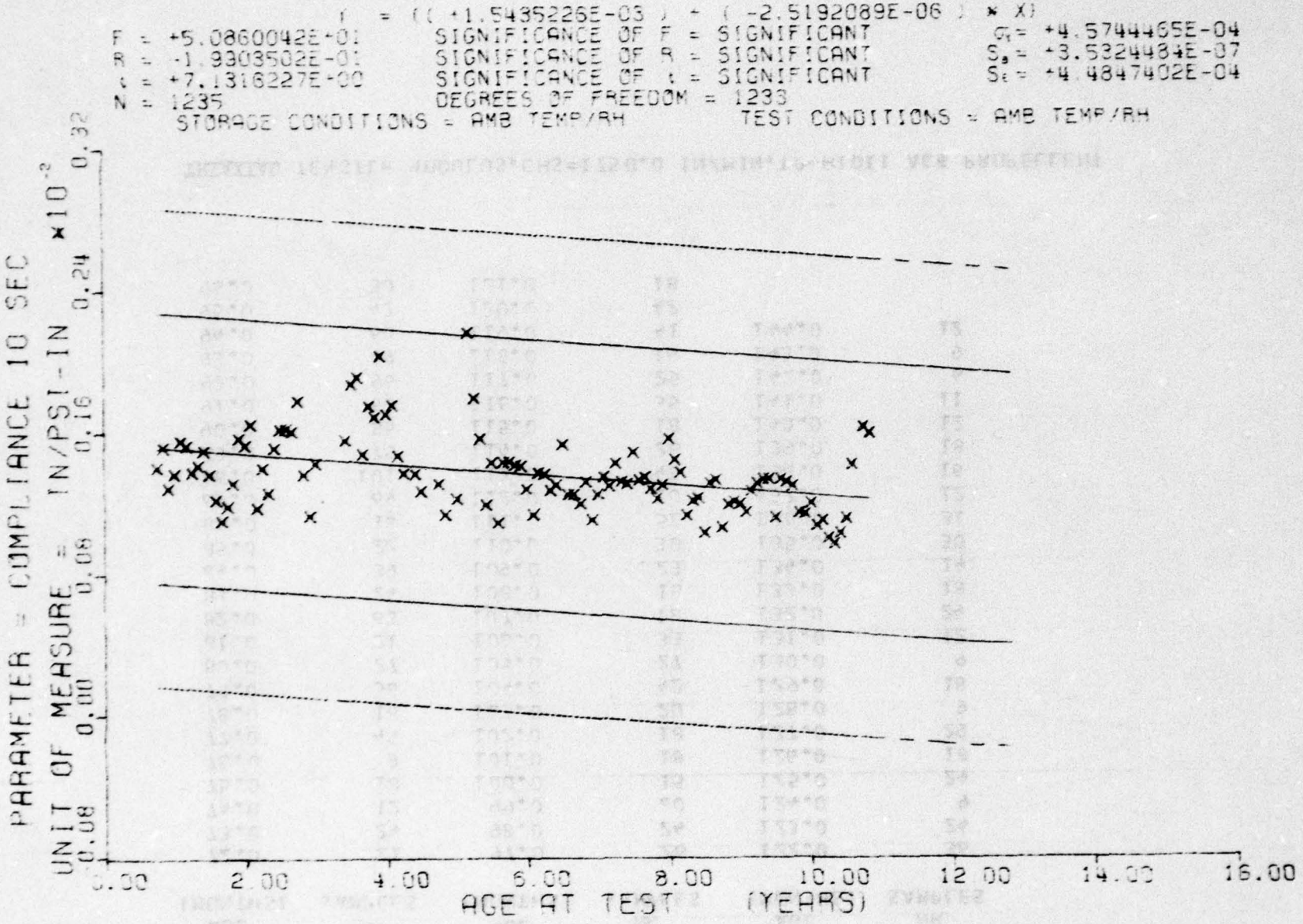
TRIAXIAL TENSILE,MODULUS,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Figure 25A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	16
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TRIAXIAL TENSILE MODULUS,CHS=1750.0 IN/MIN,TP-H1011 A&B PROPELLENT



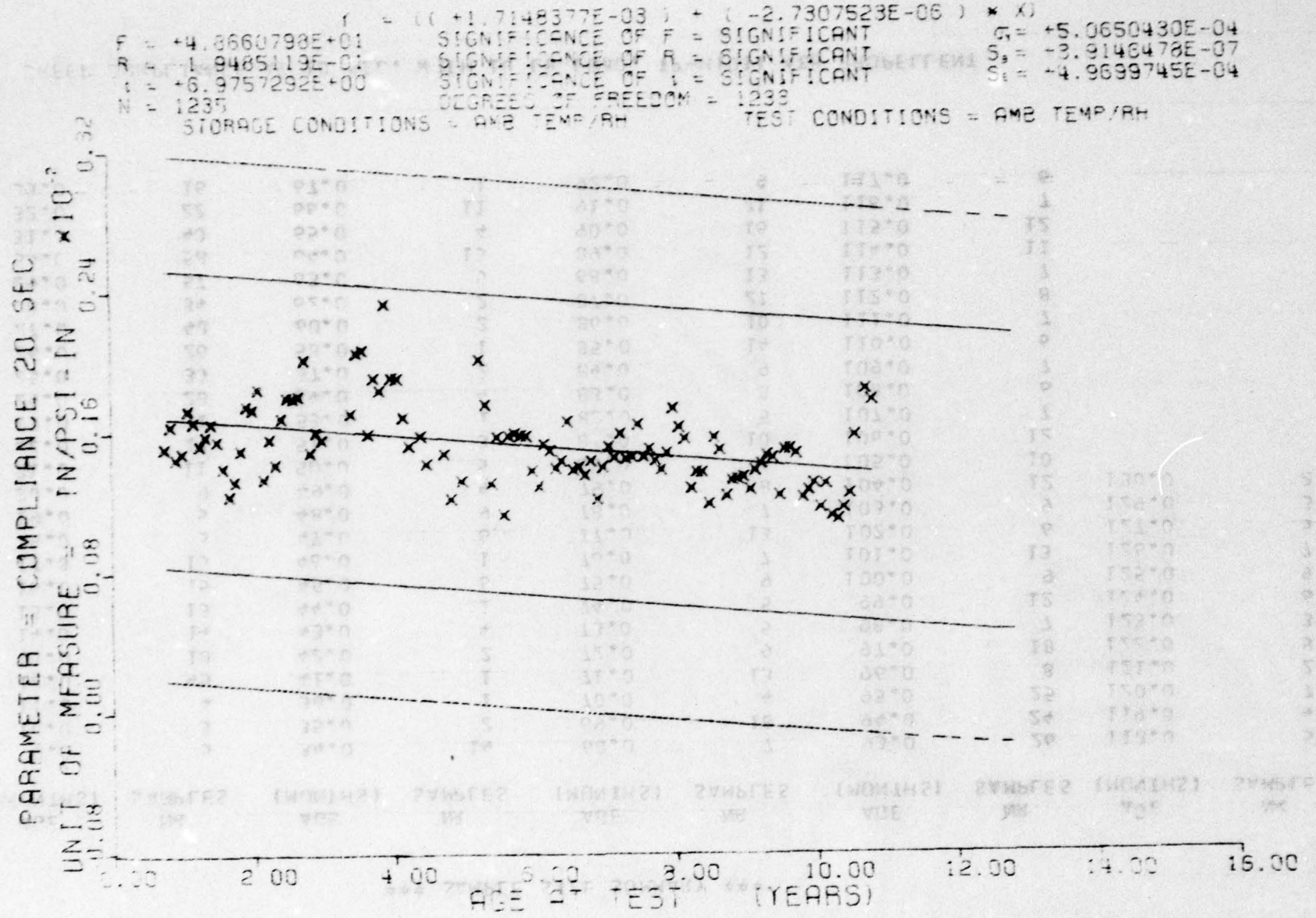
CREEP COMPLIANCE AT 10 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 26

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	9
17.0	13	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	5	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	20	54.0	4	83.0	8	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	48	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	58	64.0	15	89.0	12	114.0	11		
31.0	40	65.0	4	90.0	16	115.0	12		
32.0	22	66.0	11	91.0	21	116.0	7		
33.0	16	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 10 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT



CREEP COMPLIANCE AT 20 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 27

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLE
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	9
17.0	15	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	6	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	23	54.0	4	83.0	8	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	48	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	53	64.0	13	89.0	12	114.0	11		
31.0	40	65.0	4	90.0	16	115.0	12		
32.0	22	66.0	11	91.0	21	116.0	7		
33.0	16	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 20 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

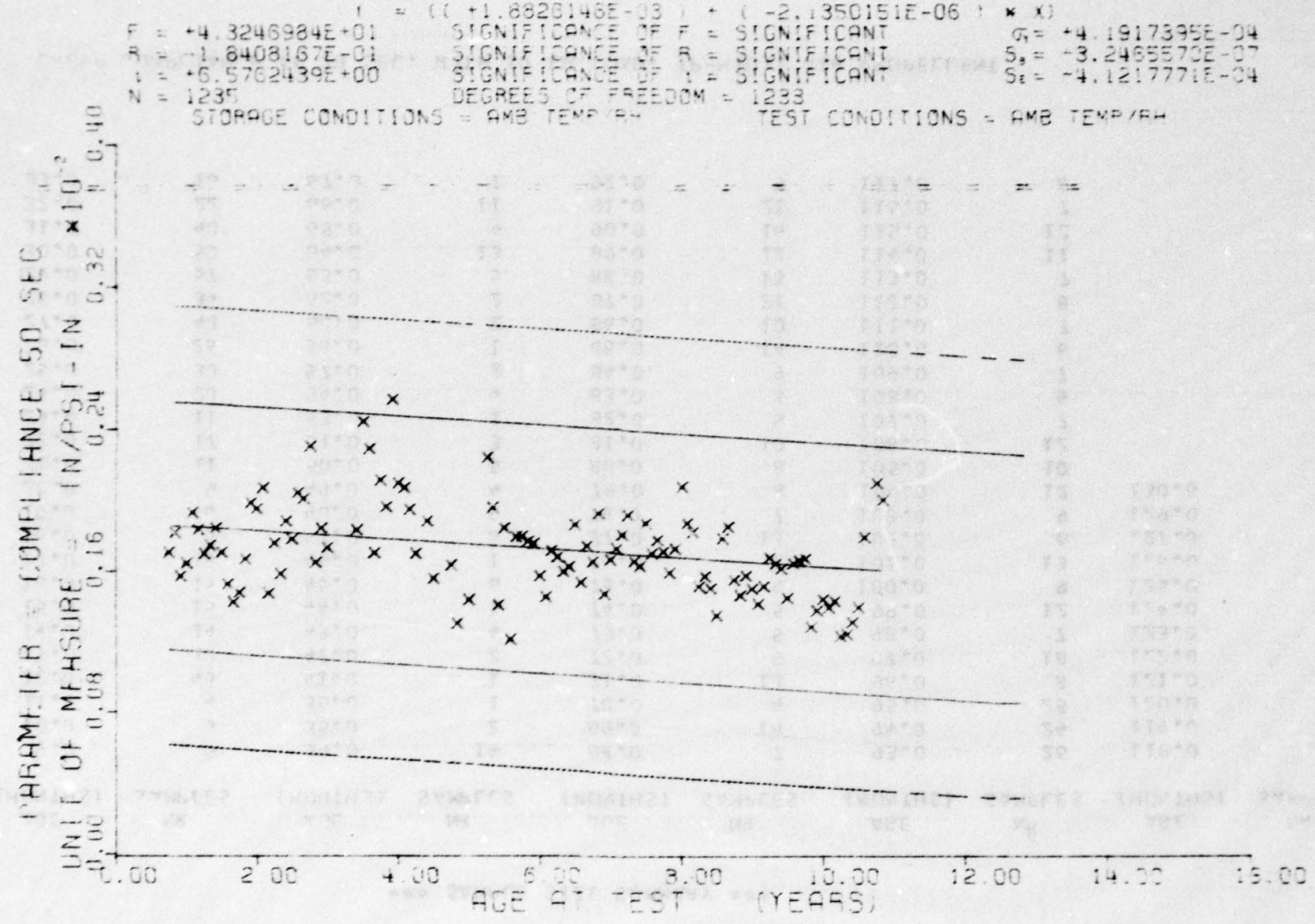
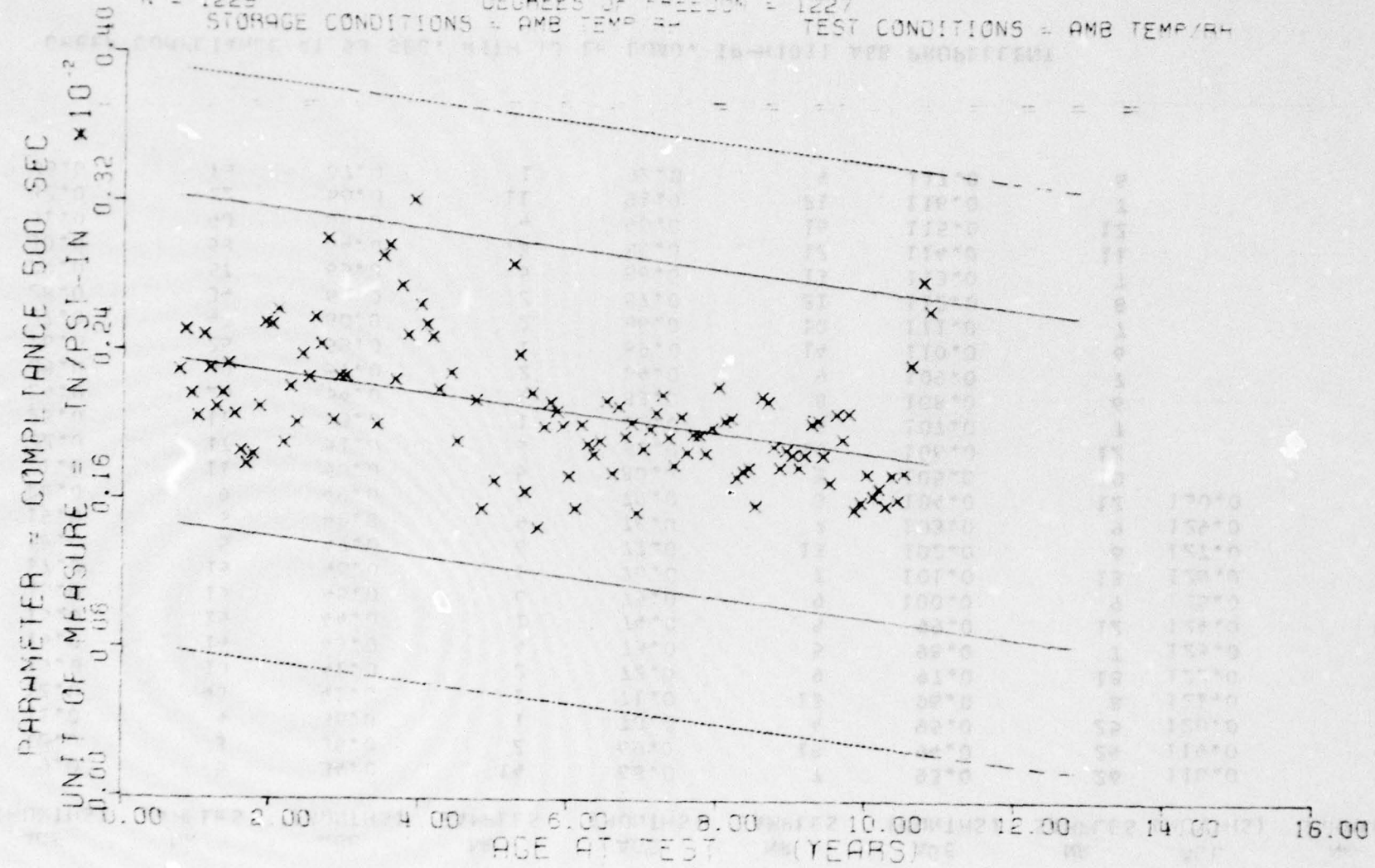

J = ((+1.8820146E-03) + (-2.4350151E-06) * X)
F = +4.3246984E+01
SIGNIFICANCE OF F = SIGNIFICANT
σJ = +4.1917395E-04
R = -1.8408167E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sb = -3.2465570E-07
t = +6.5762439E+00
SIGNIFICANCE OF t = SIGNIFICANT
Sε = -4.1217771E-04
N = 1235
DEGREES OF FREEDOM = 1233
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = COMPLIANCE 50 SEC
UNIT OF MEASURE = IN/PSI-IN *10**2
0.00
0.08
0.16
0.24
0.32
0.40
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
CREEP COMPLIANCE AT 50 SEC. WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 28

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	3
17.0	15	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	5	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	20	54.0	4	83.0	8	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	48	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	53	64.0	13	89.0	12	114.0	11		
31.0	40	65.0	4	90.0	16	115.0	12		
32.0	22	66.0	11	91.0	21	116.0	7		
33.0	15	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 50 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT



CREEP COMPLIANCE AT 500 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 29

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	3	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	20	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	5
16.0	15	45.0	6	75.0	9	100.0	9	125.0	9
17.0	13	46.0	1	76.0	7	101.0	13	126.0	1
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	6	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	3	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	20	54.0	4	83.0	8	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	43	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	57	63.0	5	88.0	13	113.0	7		
30.0	58	64.0	13	89.0	12	114.0	11		
31.0	38	65.0	4	90.0	16	115.0	12		
32.0	21	66.0	11	91.0	21	116.0	7		
33.0	13	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 500 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Y = ((+2.0173749E-03) + (-9.4173407E-07) * X)

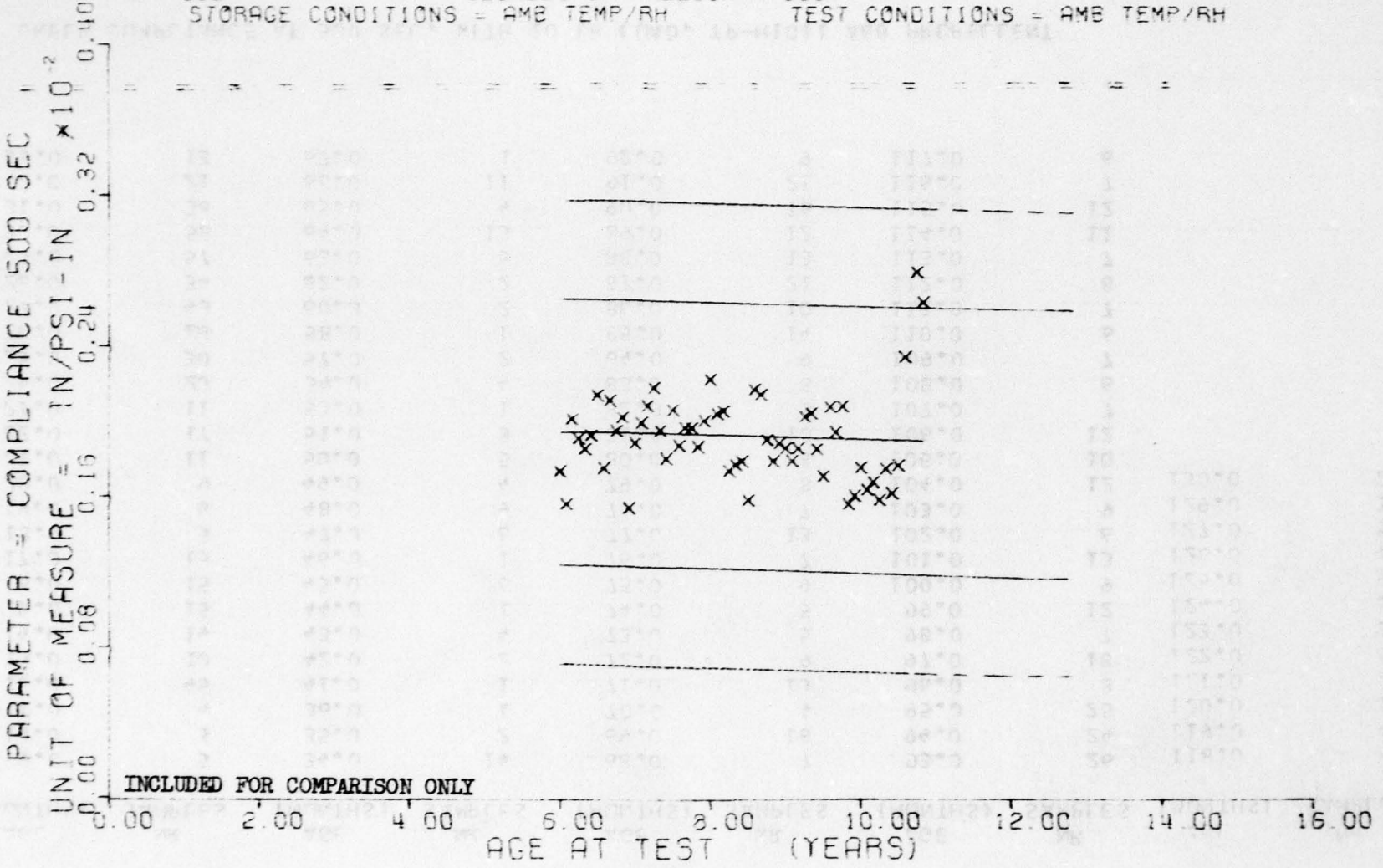
F = +5.9357231E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σ_1 = +4.0940005E-04

R = -3.2933807E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT S_a = +1.2223384E-06

t = +7.7043644E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT S_t = +4.0955113E-04

N = 552 DEGREES OF FREEDOM = 550

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



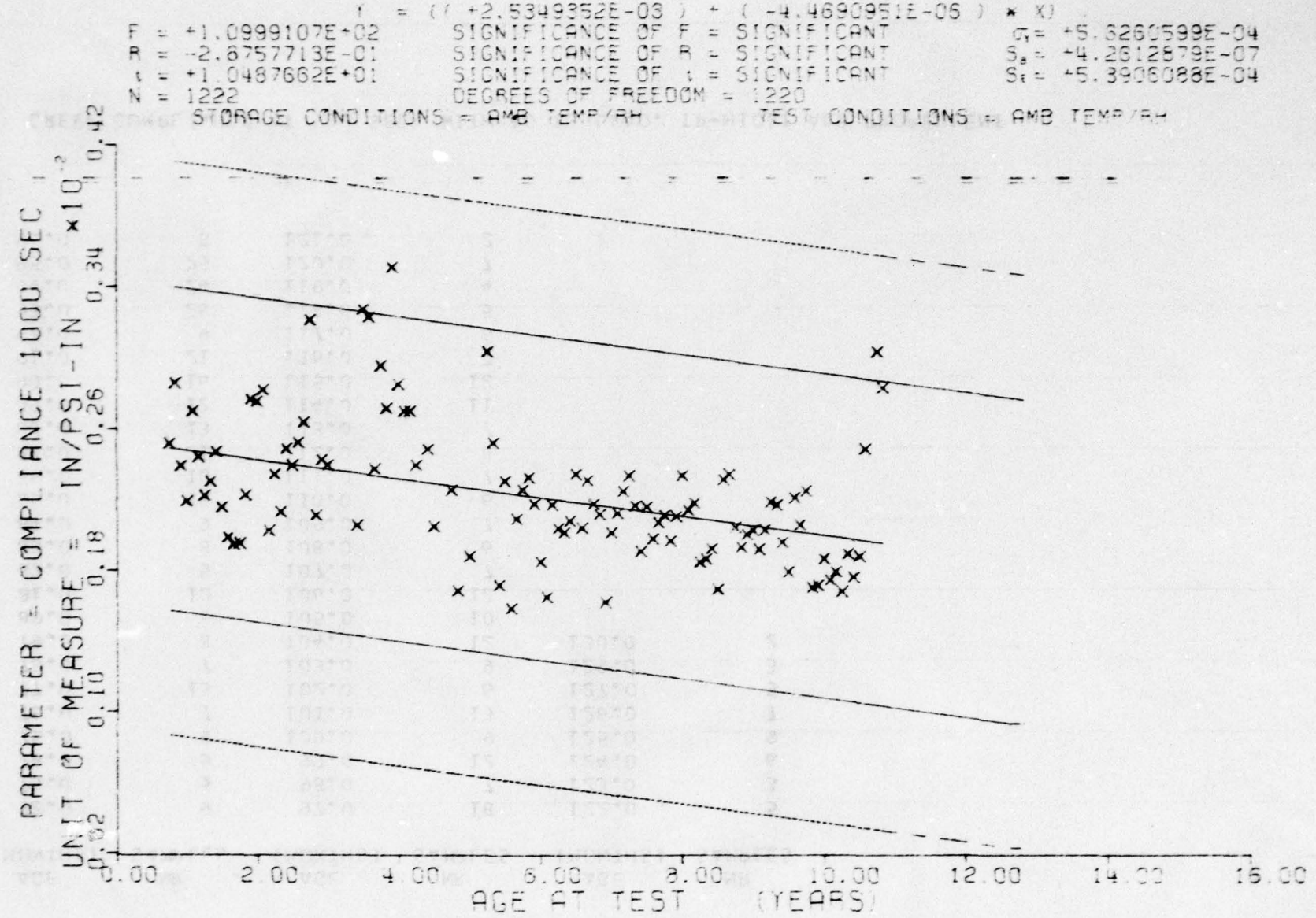
CREEP COMPLIANCE AT 500 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 29A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	18	122.0	5
73.0	5	98.0	7	123.0	3
74.0	5	99.0	12	124.0	6
75.0	9	100.0	9	125.0	9
76.0	7	101.0	13	126.0	7
77.0	13	102.0	6	127.0	5
78.0	7	103.0	9	129.0	3
79.0	8	104.0	12	130.0	2
80.0	8	105.0	10		
81.0	10	106.0	12		
82.0	5	107.0	7		
83.0	8	108.0	6		
84.0	9	109.0	7		
85.0	14	110.0	6		
86.0	10	111.0	7		
87.0	21	112.0	8		
88.0	13	113.0	7		
89.0	12	114.0	11		
90.0	16	115.0	12		
91.0	21	116.0	7		
92.0	9	117.0	6		
93.0	25	118.0	5		
94.0	24	119.0	4		
95.0	25	120.0	7		
96.0	8	121.0	2		

CREEP COMPLIANCE AT 500 SEC, WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT



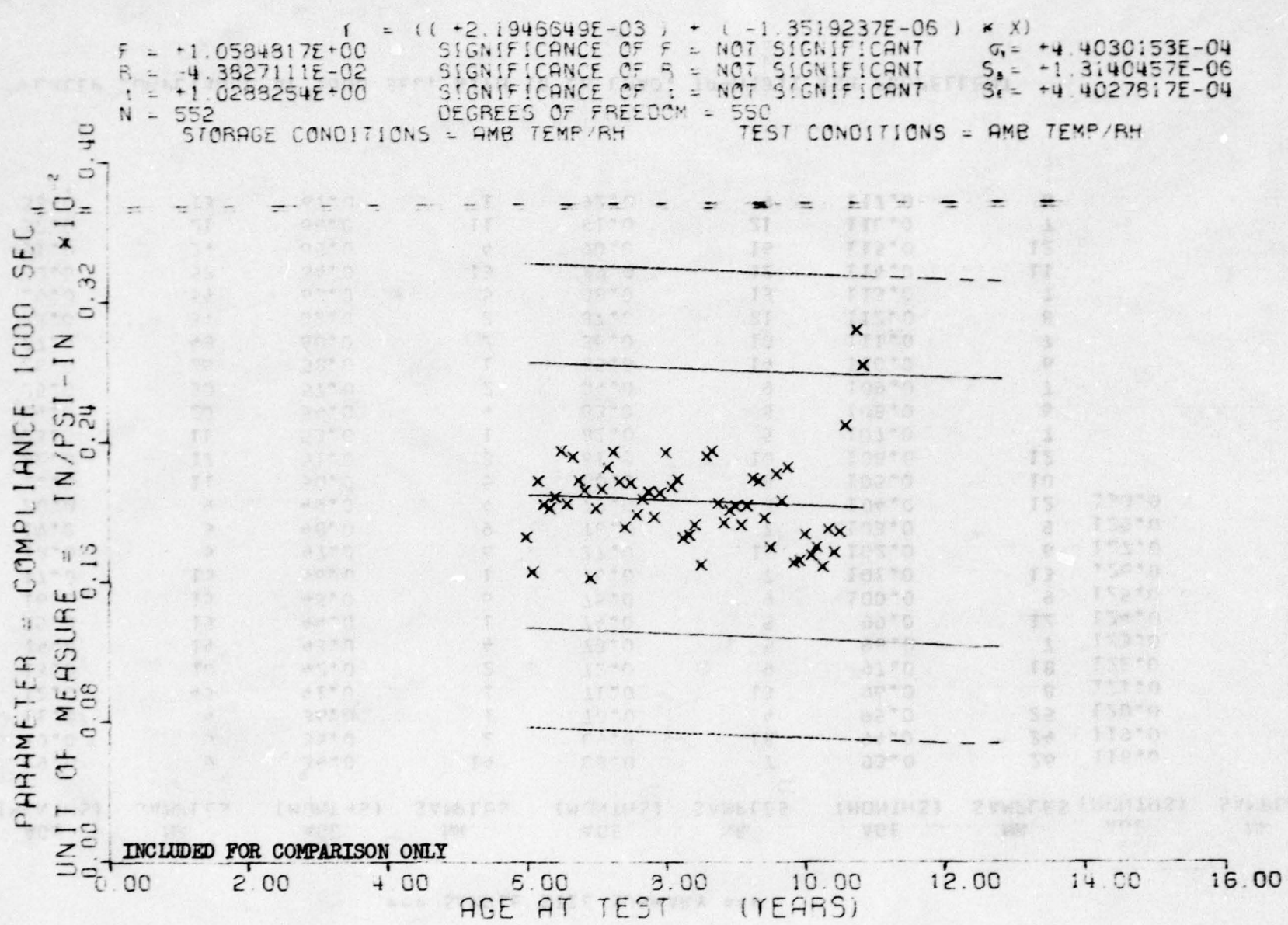
CREEP COMPLIANCE AT 1000 SEC WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 30

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	14	68.0	7	93.0	26	118.0	5
10.0	5	35.0	2	69.0	18	94.0	24	119.0	4
11.0	4	36.0	1	70.0	4	95.0	25	120.0	7
12.0	45	41.0	1	71.0	13	96.0	8	121.0	2
13.0	10	42.0	2	72.0	9	97.0	18	122.0	5
14.0	14	43.0	4	73.0	5	98.0	7	123.0	3
15.0	15	44.0	1	74.0	5	99.0	12	124.0	6
16.0	15	45.0	6	75.0	9	100.0	9	125.0	9
17.0	15	46.0	1	76.0	7	101.0	13	126.0	7
18.0	5	47.0	6	77.0	13	102.0	6	127.0	5
19.0	6	48.0	9	78.0	7	103.0	9	129.0	3
20.0	9	49.0	4	79.0	8	104.0	12	130.0	2
21.0	11	50.0	5	80.0	8	105.0	10		
22.0	17	51.0	3	81.0	10	106.0	12		
23.0	11	53.0	1	82.0	5	107.0	7		
24.0	20	54.0	4	83.0	8	108.0	6		
25.0	30	57.0	2	84.0	9	109.0	7		
26.0	26	58.0	1	85.0	14	110.0	6		
27.0	48	60.0	2	86.0	10	111.0	7		
28.0	34	62.0	2	87.0	21	112.0	8		
29.0	54	63.0	5	88.0	13	113.0	7		
30.0	58	64.0	13	89.0	12	114.0	11		
31.0	34	65.0	4	90.0	16	115.0	12		
32.0	21	66.0	11	91.0	21	116.0	7		
33.0	13	67.0	1	92.0	9	117.0	6		

CREEP COMPLIANCE AT 1000 SEC. WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT



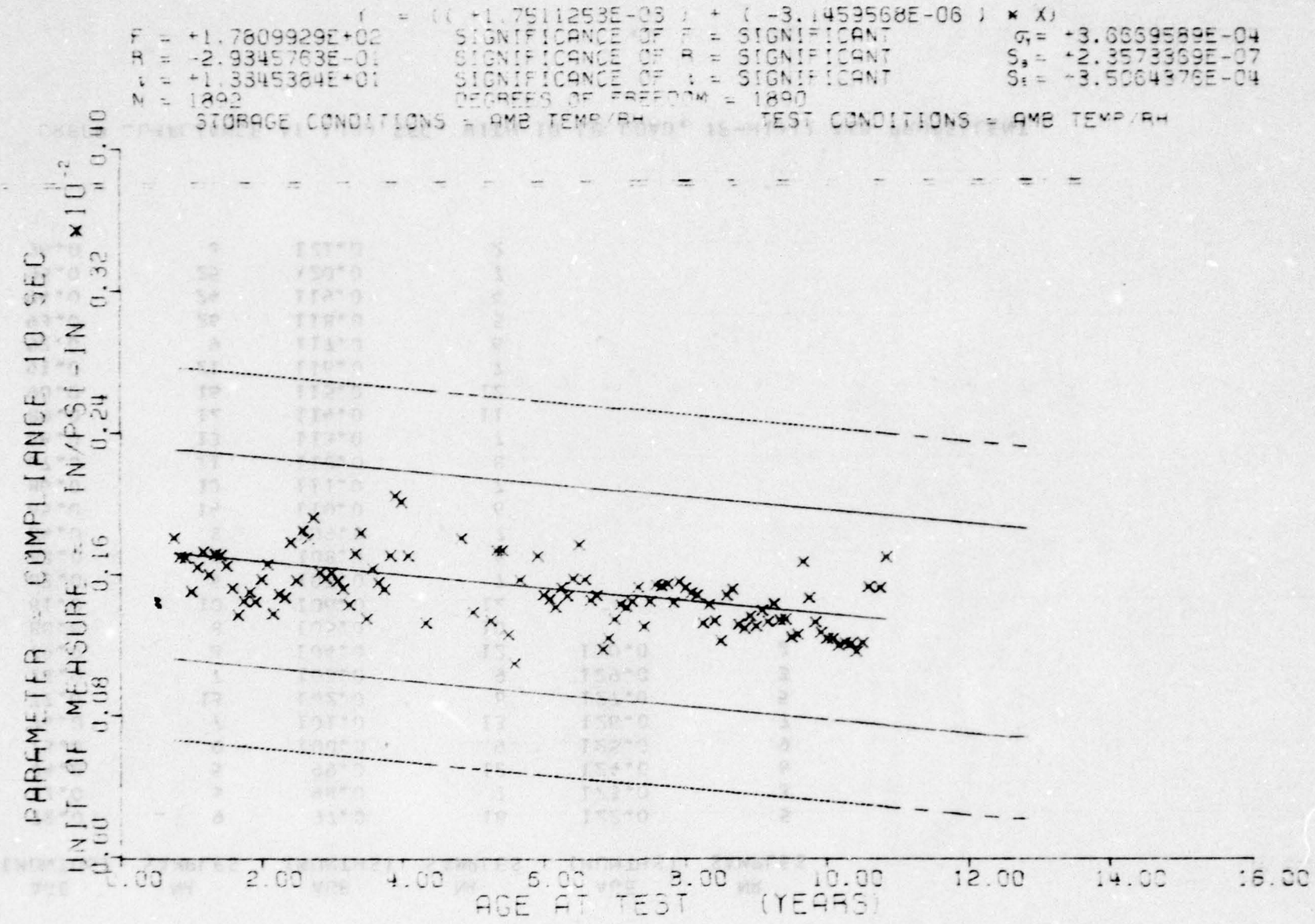
CREEP COMPLIANCE AT 1000 SEC WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 30A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	18	122.0	5
73.0	5	98.0	7	123.0	3
74.0	5	99.0	12	124.0	6
75.0	9	100.0	9	125.0	9
76.0	7	101.0	13	126.0	7
77.0	13	102.0	0	127.0	5
78.0	7	103.0	9	129.0	3
79.0	8	104.0	12	130.0	2
80.0	8	105.0	10		
81.0	10	106.0	14		
82.0	5	107.0	7		
83.0	8	108.0	6		
84.0	9	109.0	7		
85.0	14	110.0	6		
86.0	10	111.0	7		
87.0	21	112.0	8		
88.0	13	113.0	7		
89.0	14	114.0	11		
90.0	16	115.0	12		
91.0	21	116.0	7		
92.0	9	117.0	6		
93.0	26	118.0	5		
94.0	24	119.0	4		
95.0	25	120.0	7		
96.0	3	121.0	2		

CREEP COMPLIANCE AT 1000 SEC. WITH 10 LB LOAD, TP-H1011 A&B PROPELLENT



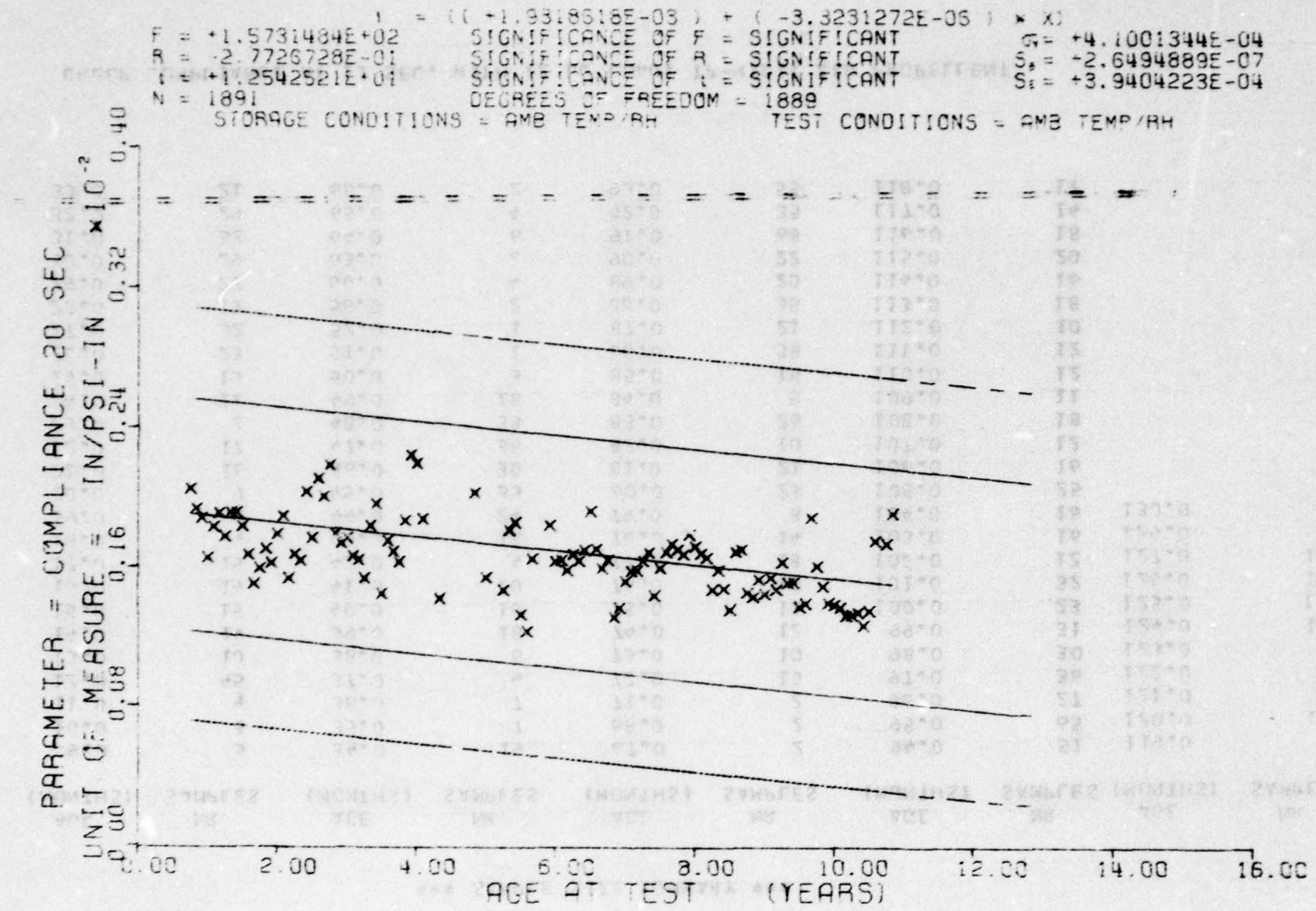
CREEP COMPLIANCE AT 10 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 31

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	19	67.0	2	94.0	51	119.0	9
10.0	3	35.0	7	68.0	2	95.0	65	120.0	14
11.0	4	36.0	7	71.0	2	96.0	27	121.0	6
12.0	45	37.0	4	72.0	15	97.0	36	122.0	8
13.0	10	38.0	6	73.0	10	98.0	30	123.0	6
14.0	14	39.0	18	74.0	12	99.0	31	124.0	12
15.0	15	40.0	10	75.0	12	100.0	23	125.0	15
16.0	14	41.0	10	76.0	10	101.0	32	126.0	13
17.0	15	42.0	4	77.0	18	102.0	12	127.0	10
18.0	4	43.0	18	78.0	14	103.0	16	129.0	6
19.0	6	44.0	24	79.0	8	104.0	16	130.0	4
20.0	9	45.0	33	80.0	23	105.0	25		
21.0	11	46.0	30	81.0	21	106.0	16		
22.0	17	47.0	38	82.0	10	107.0	12		
23.0	8	48.0	33	83.0	26	108.0	18		
24.0	11	49.0	18	84.0	8	109.0	11		
25.0	15	50.0	3	85.0	18	110.0	12		
26.0	23	51.0	1	86.0	38	111.0	12		
27.0	32	52.0	1	87.0	21	112.0	10		
28.0	19	58.0	2	88.0	38	113.0	18		
29.0	27	60.0	4	89.0	20	114.0	16		
30.0	29	63.0	2	90.0	22	115.0	20		
31.0	32	64.0	6	91.0	68	116.0	18		
32.0	29	65.0	4	92.0	35	117.0	14		
33.0	21	66.0	2	93.0	55	118.0	17		

CREEP COMPLIANCE AT 10 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT



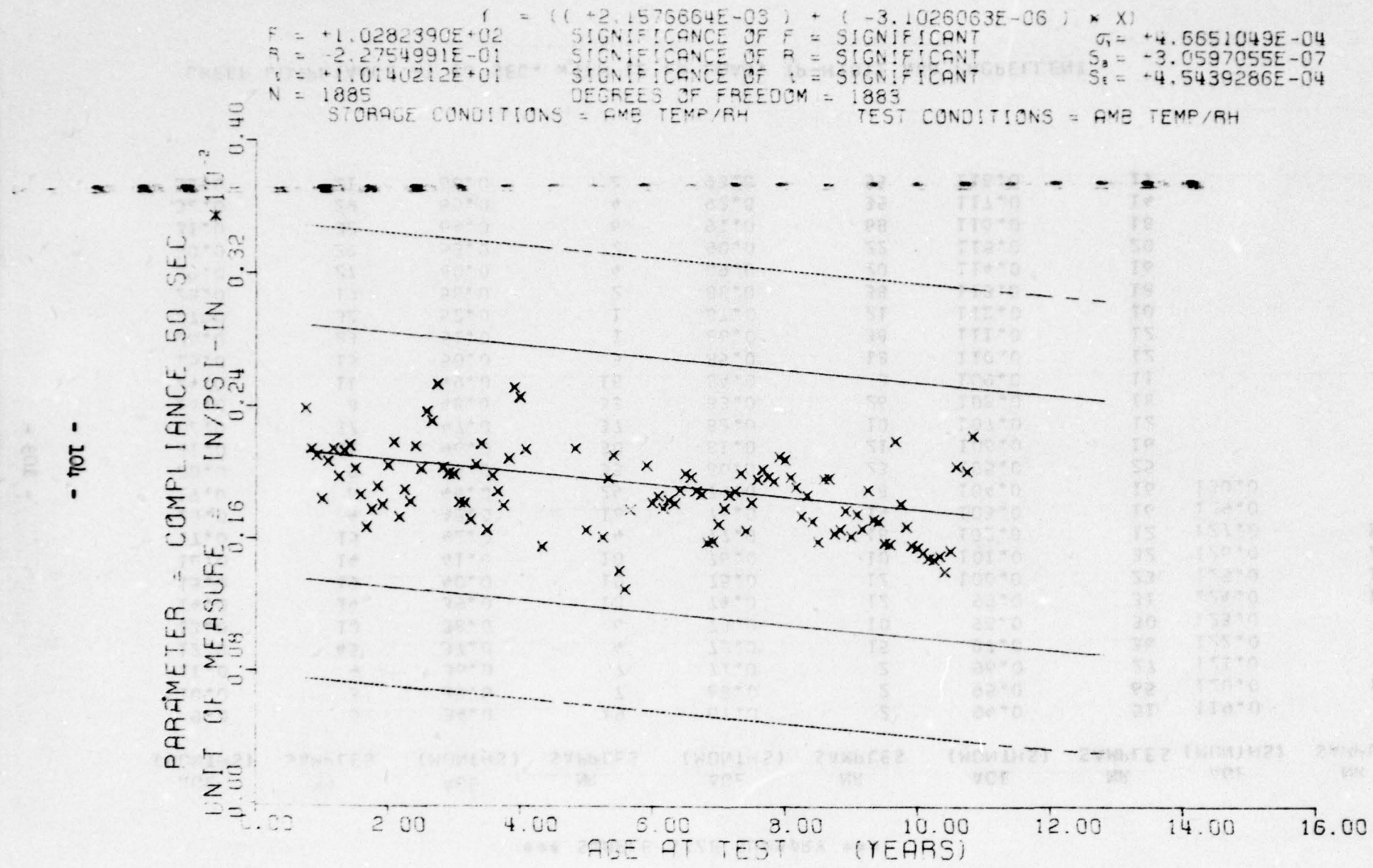
CREEP COMPLIANCE AT 20 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 32

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	19	67.0	2	94.0	51	119.0	9
10.0	3	35.0	7	68.0	2	95.0	65	120.0	14
11.0	4	36.0	7	71.0	2	96.0	27	121.0	5
12.0	45	37.0	4	72.0	15	97.0	36	122.0	3
13.0	10	38.0	6	73.0	10	98.0	30	123.0	6
14.0	14	39.0	18	74.0	12	99.0	31	124.0	12
15.0	15	40.0	10	75.0	12	100.0	23	125.0	15
16.0	14	41.0	10	76.0	10	101.0	32	126.0	13
17.0	15	42.0	4	77.0	18	102.0	12	127.0	10
18.0	4	43.0	16	78.0	14	103.0	16	129.0	6
19.0	6	44.0	24	79.0	8	104.0	16	130.0	4
20.0	9	45.0	33	80.0	23	105.0	25		
21.0	11	46.0	30	81.0	21	106.0	16		
22.0	17	47.0	37	82.0	10	107.0	12		
23.0	8	48.0	33	83.0	26	108.0	18		
24.0	11	49.0	18	84.0	8	109.0	11		
25.0	15	50.0	3	85.0	18	110.0	12		
26.0	23	51.0	1	86.0	38	111.0	12		
27.0	32	52.0	1	87.0	21	112.0	10		
28.0	19	58.0	2	88.0	38	113.0	18		
29.0	27	60.0	4	89.0	20	114.0	16		
30.0	29	63.0	2	90.0	22	115.0	20		
31.0	32	64.0	6	91.0	68	116.0	18		
32.0	29	65.0	4	92.0	35	117.0	14		
33.0	21	66.0	2	93.0	55	118.0	17		

CREEP COMPLIANCE AT 20 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT



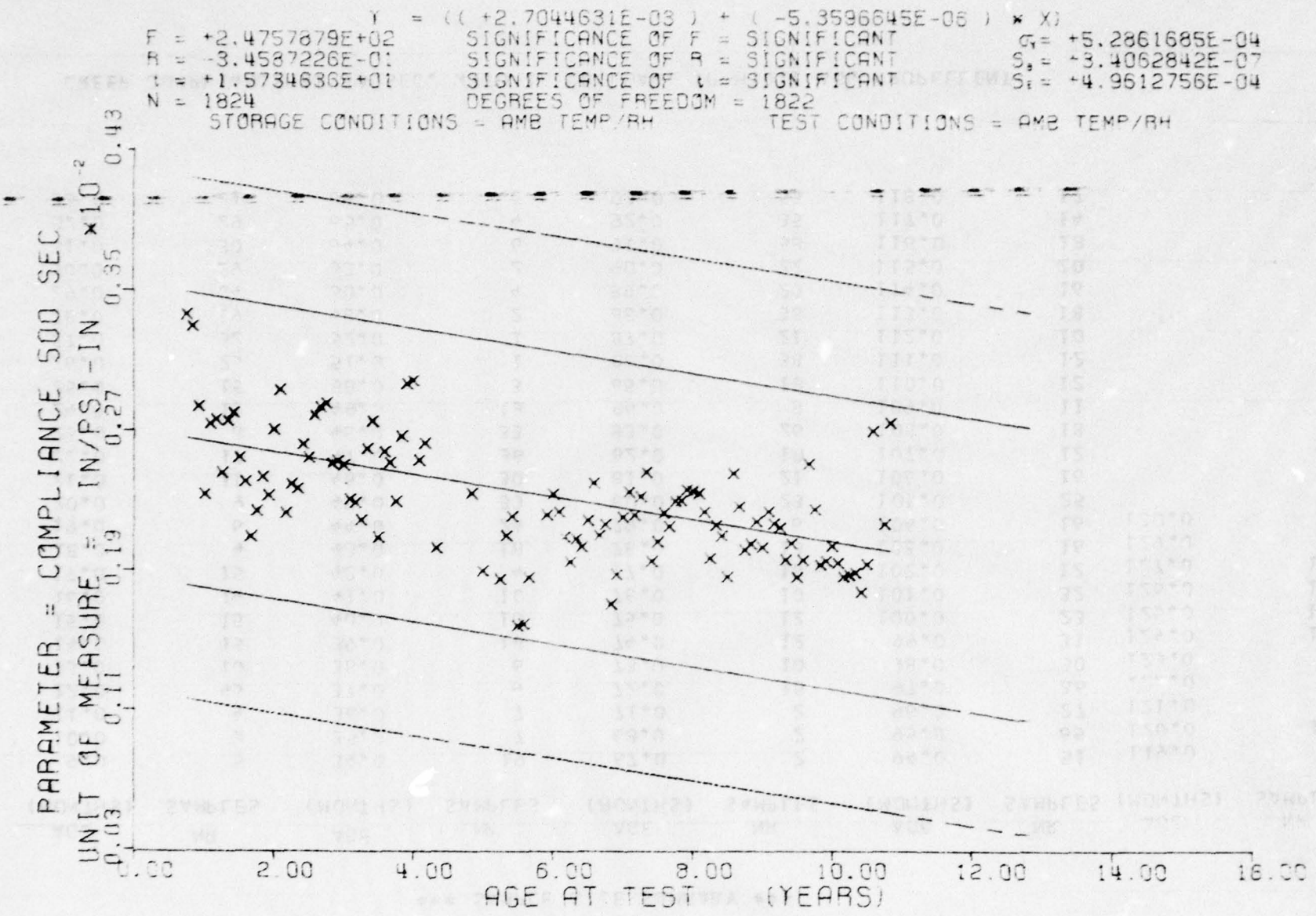
CREEP COMPLIANCE AT 50 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 33

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	19	67.0	2	94.0	51	119.0	9
10.0	3	35.0	7	68.0	2	95.0	65	120.0	14
11.0	4	36.0	7	71.0	2	96.0	27	121.0	5
12.0	42	37.0	4	72.0	15	97.0	36	122.0	8
13.0	10	38.0	6	73.0	10	98.0	30	123.0	6
14.0	15	39.0	18	74.0	12	99.0	31	124.0	12
15.0	15	40.0	10	75.0	12	100.0	23	125.0	16
16.0	14	41.0	10	76.0	10	101.0	32	126.0	13
17.0	15	42.0	4	77.0	18	102.0	12	127.0	10
18.0	4	43.0	18	78.0	13	103.0	16	129.0	6
19.0	6	44.0	24	79.0	6	104.0	16	130.0	4
20.0	9	45.0	33	80.0	23	105.0	25		
21.0	11	46.0	30	81.0	21	106.0	16		
22.0	17	47.0	36	82.0	10	107.0	12		
23.0	8	48.0	33	83.0	26	108.0	18		
24.0	11	49.0	18	84.0	8	109.0	11		
25.0	15	50.0	3	85.0	18	110.0	12		
26.0	25	51.0	1	86.0	38	111.0	12		
27.0	32	52.0	1	87.0	21	112.0	10		
28.0	19	58.0	2	88.0	36	113.0	18		
29.0	24	60.0	4	89.0	20	114.0	16		
30.0	29	63.0	2	90.0	22	115.0	20		
31.0	30	64.0	6	91.0	58	116.0	18		
32.0	29	65.0	4	92.0	35	117.0	14		
33.0	21	66.0	2	93.0	55	118.0	17		

CREEP COMPLIANCE AT 60 SEC. WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT



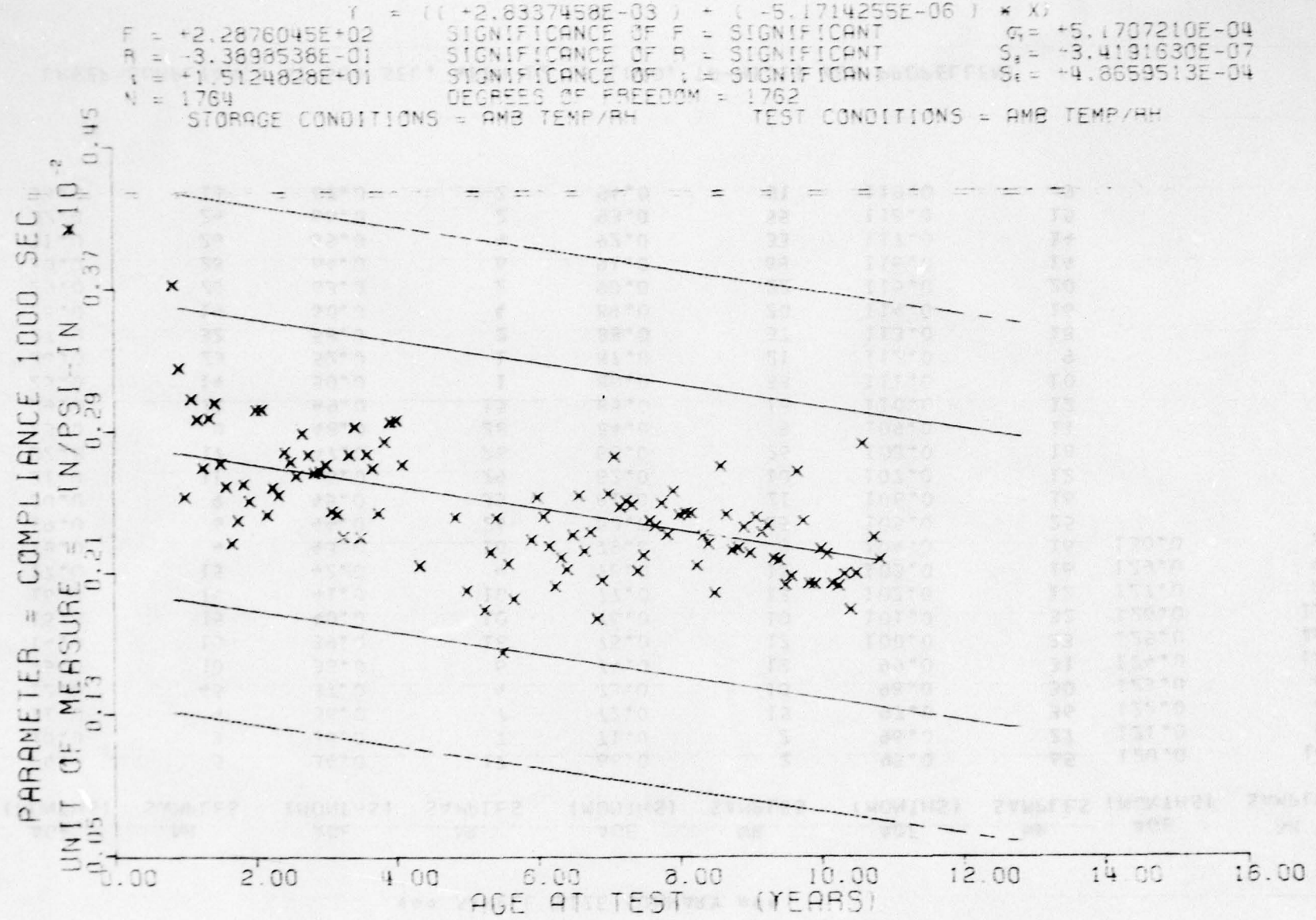
CREEP COMPLIANCE AT 500 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 34

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	5	34.0	17	68.0	2	95.0	65	120.0	14
10.0	3	35.0	7	71.0	2	96.0	27	121.0	5
11.0	4	36.0	7	72.0	15	97.0	36	122.0	3
12.0	45	37.0	4	73.0	10	98.0	30	123.0	6
13.0	10	38.0	6	74.0	12	99.0	31	124.0	12
14.0	15	39.0	18	75.0	12	100.0	23	125.0	16
15.0	15	40.0	10	76.0	10	101.0	32	126.0	13
16.0	14	41.0	10	77.0	13	102.0	12	127.0	8
17.0	15	42.0	4	78.0	12	103.0	16	129.0	4
18.0	4	43.0	18	79.0	8	104.0	16	130.0	3
19.0	6	44.0	24	80.0	23	105.0	25		
20.0	9	45.0	33	81.0	21	106.0	16		
21.0	11	46.0	29	82.0	10	107.0	12		
22.0	17	47.0	26	83.0	26	108.0	18		
23.0	8	48.0	28	84.0	8	109.0	11		
24.0	11	49.0	15	85.0	18	110.0	12		
25.0	14	50.0	1	86.0	38	111.0	10		
26.0	23	52.0	1	87.0	21	112.0	9		
27.0	32	58.0	2	88.0	37	113.0	18		
28.0	19	60.0	4	89.0	20	114.0	16		
29.0	20	63.0	2	90.0	22	115.0	20		
30.0	28	64.0	6	91.0	68	116.0	14		
31.0	26	65.0	4	92.0	33	117.0	14		
32.0	24	66.0	2	93.0	55	118.0	15		
33.0	13	67.0	2	94.0	51	119.0	9		

CREEP COMPLIANCE AT 500 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT



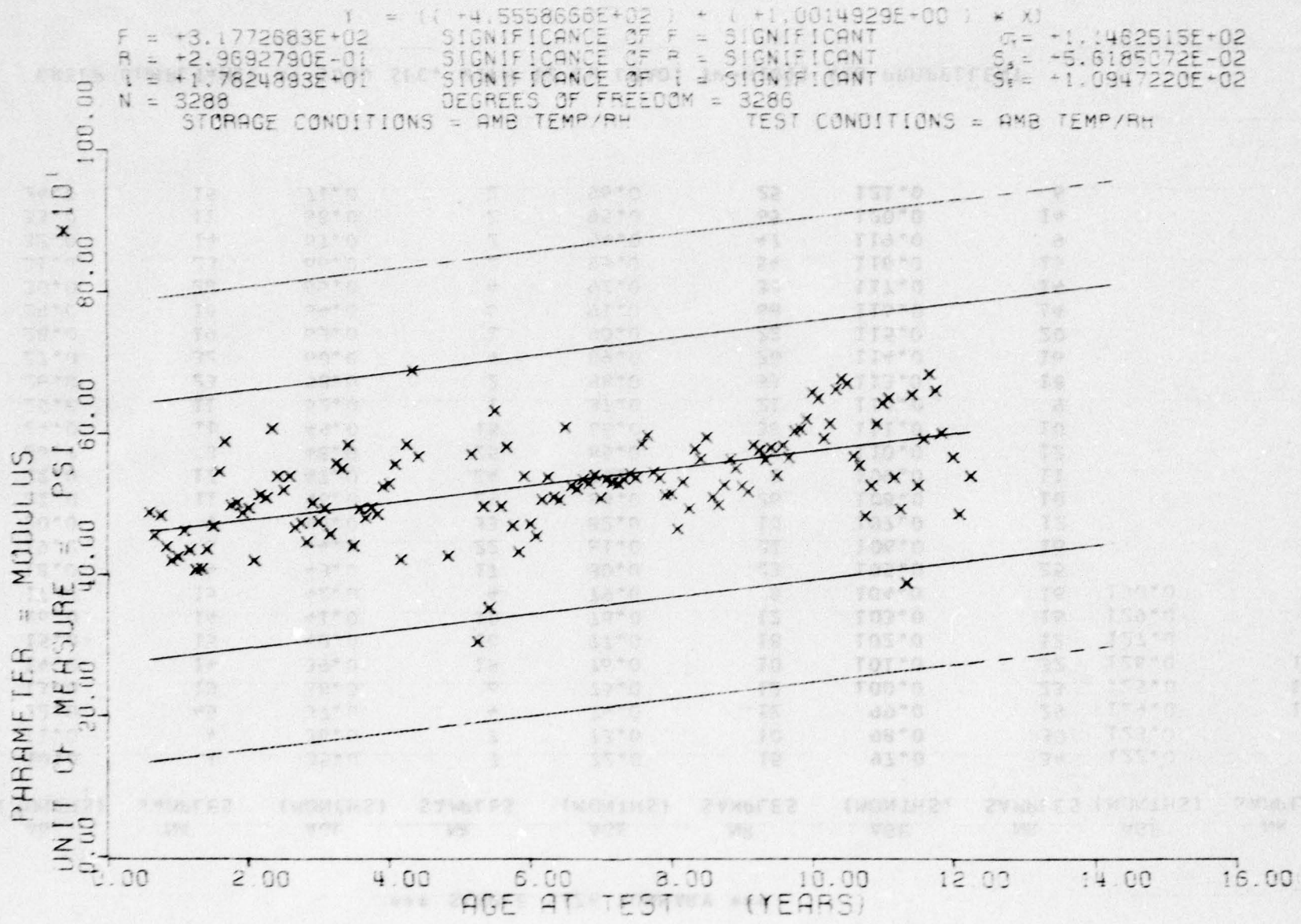
CREEP COMPLIANCE AT 1000 SEC. WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT

Figure 35

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
10.0	1	35.0	7	72.0	15	97.0	34	122.0	8
11.0	4	36.0	7	73.0	10	98.0	30	123.0	6
12.0	45	37.0	4	74.0	12	99.0	29	124.0	12
13.0	10	38.0	6	75.0	12	100.0	23	125.0	16
14.0	14	39.0	18	76.0	10	101.0	32	126.0	13
15.0	15	40.0	10	77.0	18	102.0	12	127.0	7
16.0	14	41.0	10	78.0	12	103.0	16	129.0	4
17.0	15	42.0	4	79.0	8	104.0	16	130.0	2
18.0	4	43.0	17	80.0	23	105.0	25		
19.0	6	44.0	22	81.0	21	106.0	16		
20.0	9	45.0	33	82.0	10	107.0	12		
21.0	11	46.0	29	83.0	26	108.0	18		
22.0	17	47.0	24	84.0	8	109.0	11		
23.0	3	48.0	25	85.0	18	110.0	12		
24.0	11	49.0	15	86.0	38	111.0	10		
25.0	11	52.0	1	87.0	21	112.0	9		
26.0	23	58.0	2	88.0	33	113.0	18		
27.0	32	60.0	4	89.0	20	114.0	16		
28.0	19	63.0	2	90.0	22	115.0	20		
29.0	18	64.0	6	91.0	68	116.0	14		
30.0	28	65.0	4	92.0	33	117.0	14		
31.0	23	66.0	2	93.0	54	118.0	15		
32.0	14	67.0	2	94.0	47	119.0	9		
33.0	11	68.0	2	95.0	65	120.0	14		
34.0	15	71.0	2	96.0	25	121.0	6		

CREEP COMPLIANCE AT 1000 SEC, WITH 12 LB LOAD, TP-H1011 A&B PROPELLENT



STRESS RELAXATION 3% STRAIN, MODULUS AT 10 SEC, TP-H1011 A&B

Figure 36

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	39	64.0	9	89.0	66	114.0	33
8.0	5	33.0	38	65.0	12	90.0	72	115.0	35
9.0	5	34.0	30	66.0	12	91.0	113	116.0	20
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29
11.0	5	36.0	29	68.0	6	93.0	93	118.0	18
12.0	7	37.0	23	69.0	17	94.0	60	119.0	33
13.0	6	38.0	20	70.0	27	95.0	39	120.0	36
14.0	10	39.0	12	71.0	24	96.0	30	121.0	15
15.0	12	40.0	28	72.0	24	97.0	23	122.0	3
16.0	9	41.0	38	73.0	21	98.0	30	123.0	12
17.0	6	42.0	84	74.0	21	99.0	15	124.0	24
18.0	8	43.0	63	75.0	21	100.0	48	125.0	15
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44
20.0	11	45.0	39	77.0	15	102.0	27	127.0	54
21.0	12	46.0	46	78.0	27	103.0	43	128.0	18
22.0	9	47.0	36	79.0	27	104.0	34	129.0	30
23.0	8	48.0	15	80.0	30	105.0	27	130.0	12
24.0	3	49.0	17	81.0	18	106.0	33	131.0	21
25.0	18	50.0	5	82.0	36	107.0	24	132.0	28
26.0	13	51.0	4	83.0	27	108.0	42	133.0	3
27.0	17	52.0	3	84.0	27	109.0	27	134.0	9
28.0	17	53.0	5	85.0	33	110.0	21	135.0	15
29.0	29	58.0	3	86.0	33	111.0	18	136.0	9
30.0	29	62.0	3	87.0	69	112.0	36	137.0	24
31.0	51	63.0	3	88.0	59	113.0	21	138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 3% STRAIN, MODULUS AT 10 SEC, TP-H1011 A&B

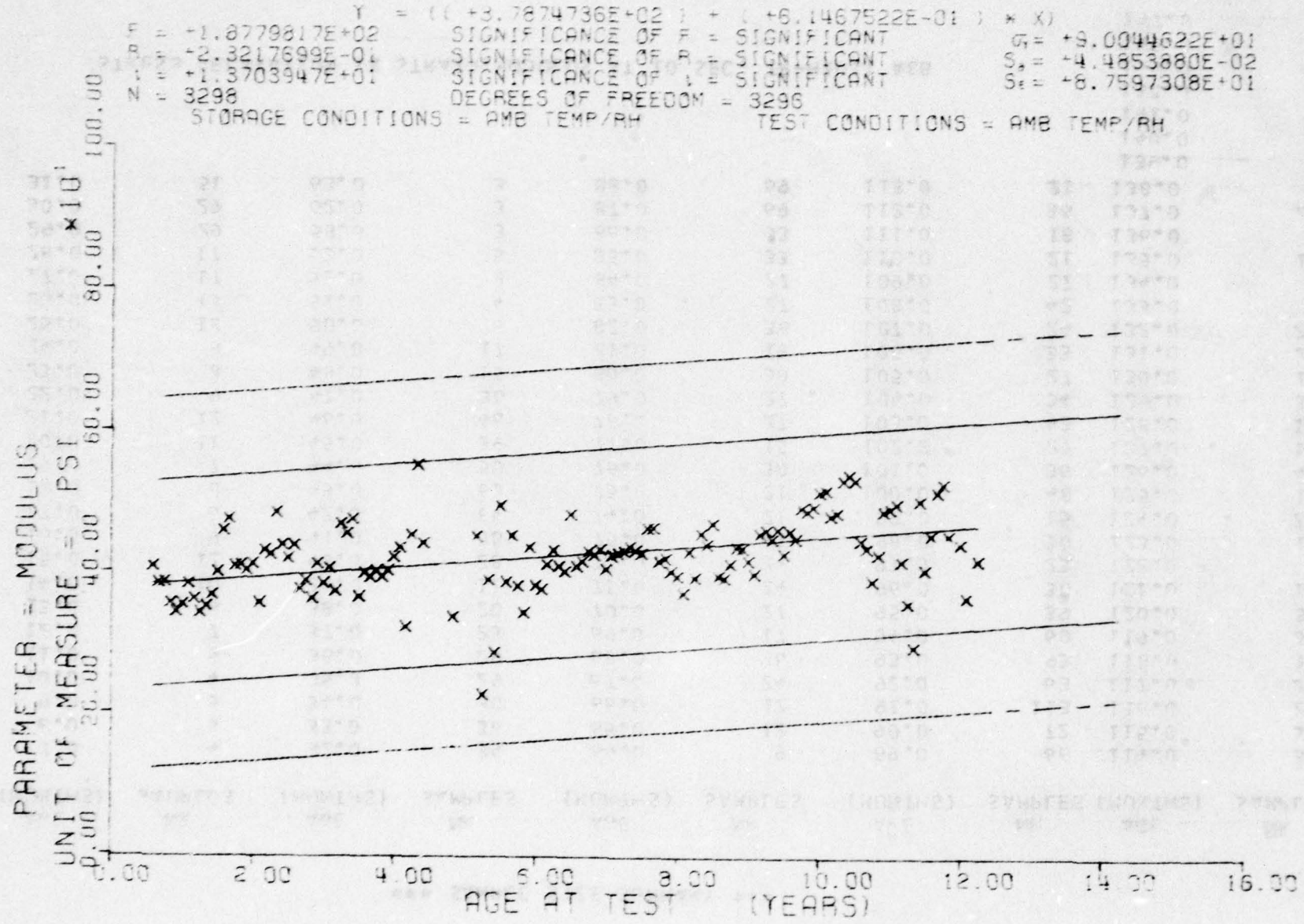

Y = ((+3.7874736E+02) + (+6.1467522E-01) * X)
F = +1.8779817E+02
R = +2.3217699E-01
t = +1.3703947E+01
N = 3298
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 3296
σy = +9.0044622E+01
Sa = +4.4853880E-02
Se = +8.7597308E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10³
0.00
20.00
40.00
60.00
80.00
100.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 3% STRAIN, MODULUS AT 60 SEC, TP-H1011 A&B

Figure 37

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	39	64.0	9	89.0	66	114.0	33
8.0	3	33.0	38	65.0	12	90.0	72	115.0	36
9.0	5	34.0	30	66.0	12	91.0	113	116.0	20
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29
11.0	5	36.0	29	68.0	6	93.0	93	118.0	18
12.0	7	37.0	23	69.0	17	94.0	60	119.0	33
13.0	6	38.0	20	70.0	27	95.0	39	120.0	36
14.0	10	39.0	22	71.0	24	96.0	30	121.0	15
15.0	12	40.0	28	72.0	24	97.0	23	122.0	6
16.0	9	41.0	38	73.0	21	98.0	30	123.0	12
17.0	6	42.0	84	74.0	21	99.0	15	124.0	24
18.0	8	43.0	63	75.0	21	100.0	48	125.0	15
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44
20.0	11	45.0	39	77.0	15	102.0	27	127.0	54
21.0	12	46.0	48	78.0	27	103.0	43	128.0	18
22.0	9	47.0	36	79.0	27	104.0	34	129.0	30
23.0	8	48.0	15	80.0	30	105.0	27	130.0	12
24.0	8	49.0	17	81.0	18	106.0	33	131.0	21
25.0	18	50.0	5	82.0	36	107.0	24	132.0	28
26.0	13	51.0	4	83.0	27	108.0	42	133.0	6
27.0	17	52.0	3	84.0	27	109.0	27	134.0	9
28.0	17	53.0	5	85.0	33	110.0	21	135.0	15
29.0	29	58.0	3	86.0	33	111.0	18	136.0	9
30.0	29	62.0	3	87.0	69	112.0	36	137.0	24
31.0	51	63.0	3	88.0	69	113.0	21	138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 3% STRAIN,MODULUS AT 50 SEC, FP-H1011 A&B

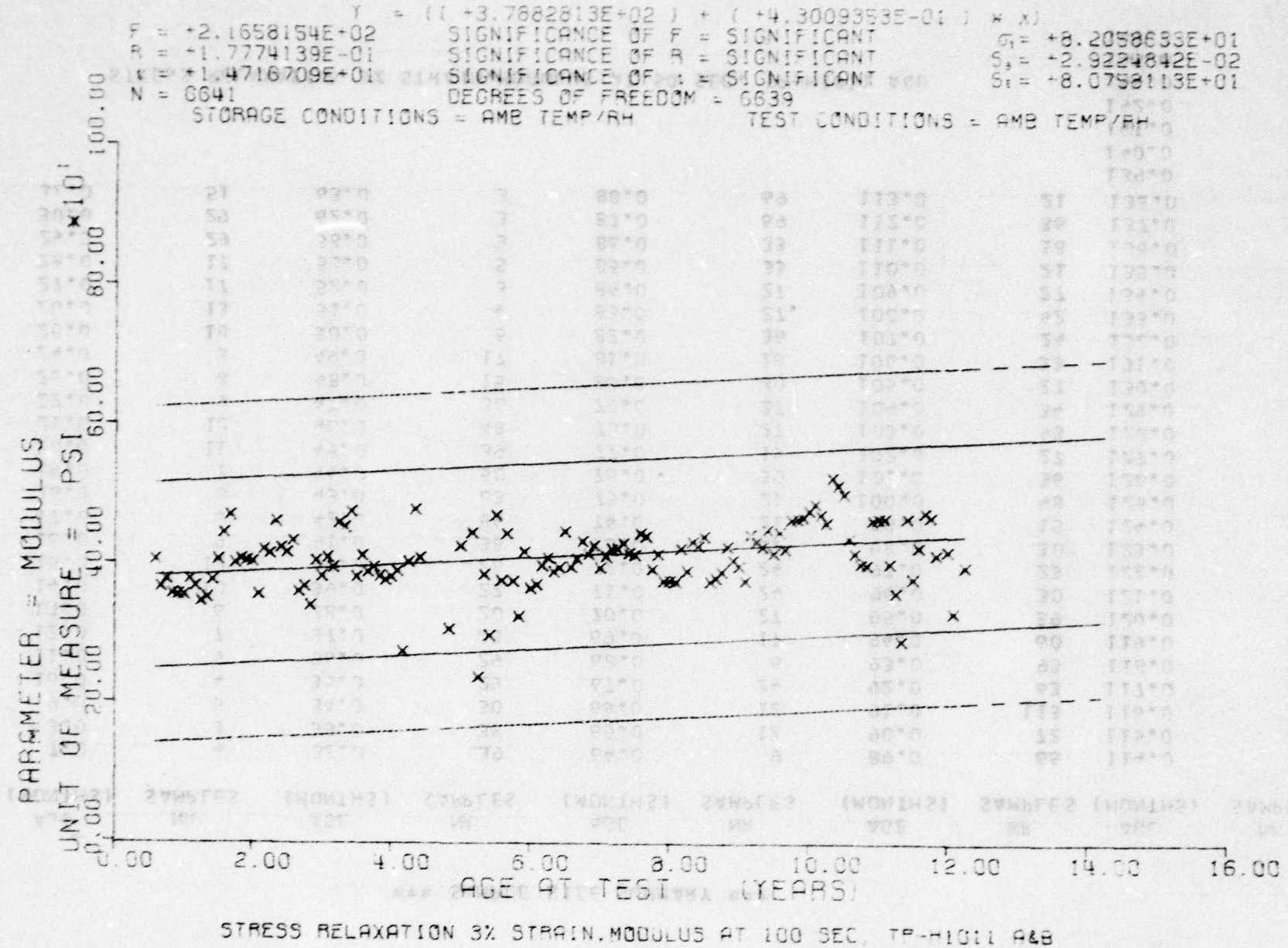

Y = ((+3.7682813E+02) + (+4.3009353E-01) * X)
F = +2.1658154E+02
SIGNIFICANCE OF F = SIGNIFICANT
σ1 = +8.2058633E+01
R = +1.7774139E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sb = +2.9224842E-02
α = +1.4716709E+01
SIGNIFICANCE OF α = SIGNIFICANT
St = +8.0758113E+01
N = 6641
DEGREES OF FREEDOM = 6639
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI x10¹
100.00
80.00
60.00
40.00
20.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 3% STRAIN, MODULUS AT 100 SEC, TP-HIOII A&B

Figure 38

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	8	32.0	79	63.0	6	88.0	135	113.0	39
8.0	6	33.0	76	64.0	18	89.0	135	114.0	66
9.0	10	34.0	60	65.0	24	90.0	153	115.0	66
10.0	8	35.0	59	66.0	24	91.0	212	116.0	41
11.0	10	36.0	56	67.0	48	92.0	132	117.0	62
12.0	14	37.0	45	68.0	12	93.0	183	118.0	30
13.0	12	38.0	40	69.0	35	94.0	120	119.0	66
14.0	20	39.0	45	70.0	54	95.0	75	120.0	72
15.0	24	40.0	55	71.0	51	96.0	60	121.0	30
16.0	18	41.0	70	72.0	50	97.0	50	122.0	12
17.0	12	42.0	164	73.0	42	98.0	60	123.0	24
18.0	16	43.0	124	74.0	42	99.0	33	124.0	45
19.0	14	44.0	94	75.0	48	100.0	87	125.0	36
20.0	22	45.0	79	76.0	68	101.0	75	126.0	77
21.0	24	46.0	96	77.0	30	102.0	57	127.0	95
22.0	18	47.0	72	78.0	54	103.0	79	128.0	55
23.0	16	48.0	30	79.0	54	104.0	61	129.0	42
24.0	16	49.0	34	80.0	60	105.0	65	130.0	33
25.0	36	50.0	10	81.0	38	106.0	69	131.0	42
26.0	20	51.0	17	82.0	69	107.0	48	132.0	61
27.0	34	52.0	7	83.0	54	108.0	111	133.0	15
28.0	34	53.0	10	84.0	54	109.0	54	134.0	15
29.0	58	58.0	6	85.0	66	110.0	45	135.0	27
30.0	58	60.0	3	86.0	65	111.0	36	136.0	18
31.0	102	62.0	6	87.0	138	112.0	72	137.0	42
								138.0	12
								139.0	42
								140.0	18
								141.0	24
								142.0	18
								144.0	6
								145.0	6
								147.0	12

STRESS RELAXATION 3% STRAIN.MODULUS AT 100 SEC. TP-H1011 A&B

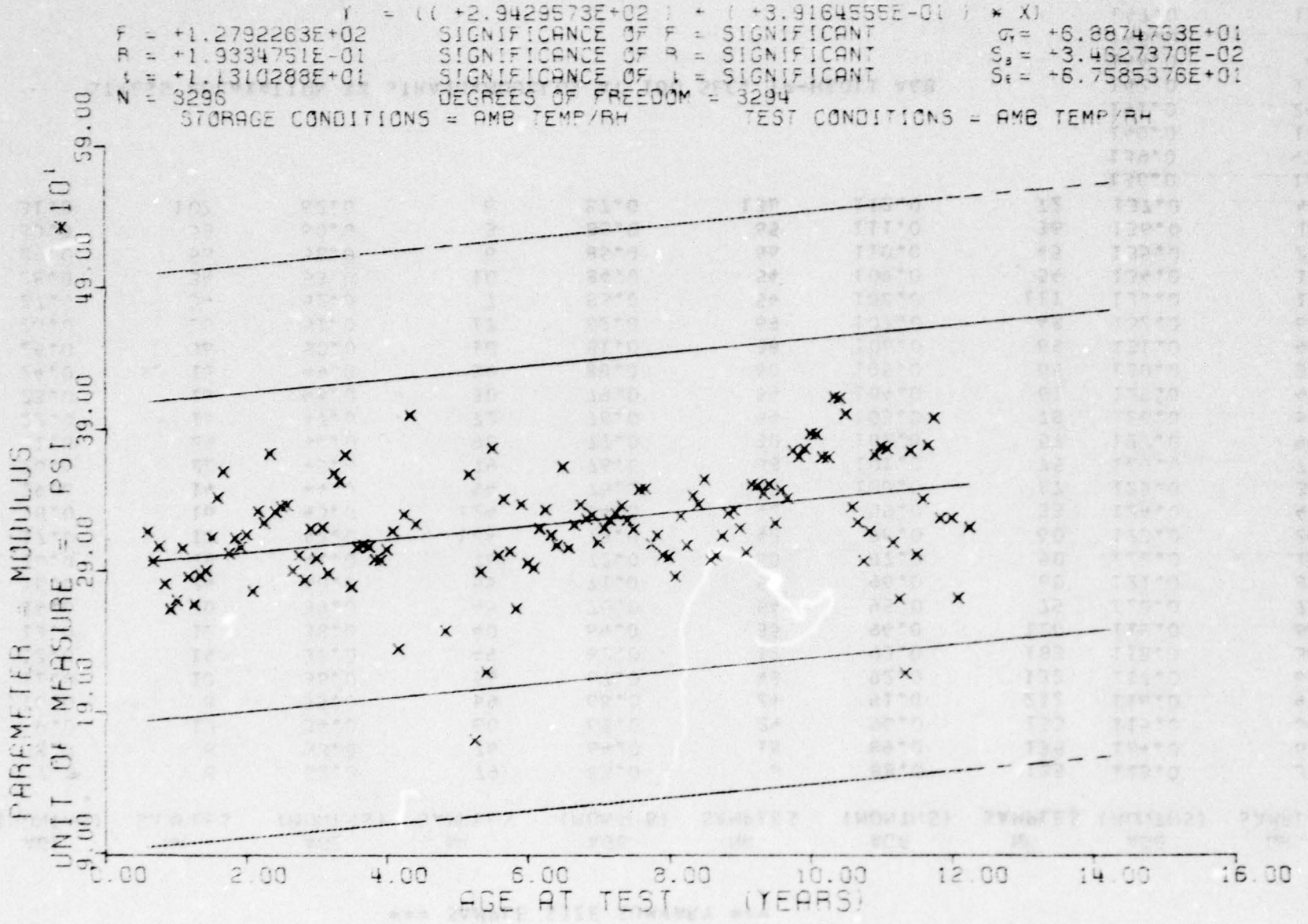
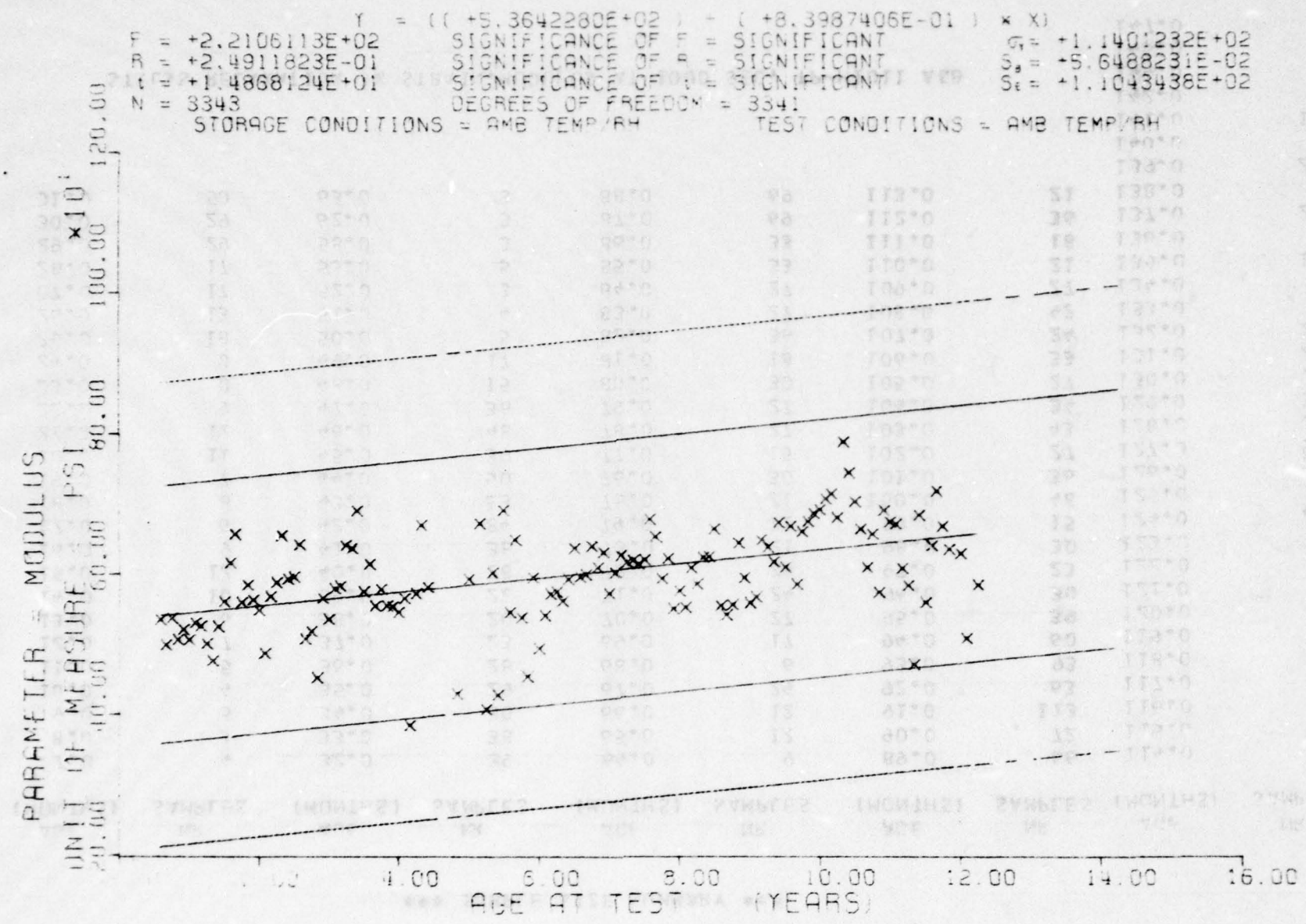

Y = ((+2.9429573E+02) + (+3.9164555E-01) * X)
F = +1.2792263E+02 SIGNIFICANCE OF F = SIGNIFICANT σr = +6.8874783E+01
R = +1.9334751E-01 SIGNIFICANCE OF R = SIGNIFICANT Sa = +3.4627370E-02
t = +1.1310288E+01 SIGNIFICANCE OF t = SIGNIFICANT St = +6.7585376E+01
N = 3296 DEGREES OF FREEDOM = 3294
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10¹
9.00
19.00
29.00
39.00
49.00
59.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 3% STRAIN, MODULUS AT 1000 SEC. TP-H1011 A&B

Figure 39

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLE
7.0	4	32.0	39	64.0	9	89.0	66	114.0	33
8.0	3	33.0	38	65.0	12	90.0	72	115.0	36
9.0	5	34.0	30	66.0	12	91.0	113	116.0	20
10.0	4	35.0	29	67.0	24	92.0	63	117.0	29
11.0	5	36.0	28	68.0	6	93.0	93	118.0	18
12.0	7	37.0	23	69.0	17	94.0	60	119.0	33
13.0	6	38.0	20	70.0	27	95.0	39	120.0	26
14.0	10	39.0	22	71.0	24	96.0	30	121.0	15
15.0	12	40.0	28	72.0	24	97.0	23	122.0	6
16.0	9	41.0	38	73.0	21	98.0	30	123.0	12
17.0	6	42.0	84	74.0	21	99.0	15	124.0	24
18.0	8	43.0	63	75.0	21	100.0	48	125.0	15
19.0	7	44.0	50	76.0	30	101.0	36	126.0	44
20.0	11	45.0	39	77.0	15	102.0	27	127.0	54
21.0	12	46.0	48	78.0	27	103.0	43	128.0	18
22.0	9	47.0	36	79.0	27	104.0	34	129.0	30
23.0	8	48.0	15	80.0	30	105.0	27	130.0	12
24.0	3	49.0	17	81.0	18	106.0	33	131.0	21
25.0	18	50.0	5	82.0	36	107.0	24	132.0	26
26.0	13	51.0	4	83.0	27	108.0	42	133.0	3
27.0	17	52.0	3	84.0	27	109.0	27	134.0	9
28.0	17	53.0	5	85.0	33	110.0	21	135.0	15
29.0	29	58.0	3	86.0	33	111.0	18	136.0	9
30.0	29	62.0	3	87.0	69	112.0	36	137.0	24
31.0	50	63.0	3	88.0	69	113.0	21	138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 3% STRAIN,MODULUS AT 1000 SEC, TP-H1011 A&B



STRESS RELAXATION 5% STRAIN, MODULUS AT 10 SEC. TP-H1011 A&B

Figure 40

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	40	63.0	3	88.0	66	113.0	18
8.0	3	33.0	38	64.0	9	89.0	69	114.0	33
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33
12.0	7	37.0	26	68.0	6	93.0	90	118.0	18
13.0	6	38.0	20	69.0	18	94.0	60	119.0	33
14.0	10	39.0	23	70.0	27	95.0	36	120.0	36
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15
16.0	9	41.0	38	72.0	26	97.0	27	122.0	6
17.0	5	42.0	60	73.0	21	98.0	30	123.0	12
18.0	3	43.0	61	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21
20.0	11	45.0	40	76.0	38	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41
22.0	9	47.0	36	78.0	27	103.0	36	128.0	37
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21
25.0	13	50.0	5	81.0	20	106.0	36	131.0	21
26.0	15	51.0	15	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9
29.0	29	58.0	3	85.0	33	110.0	24	135.0	12
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9
31.0	51	62.0	3	87.0	69	112.0	36	137.0	18
								138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 5% STRAIN.MODULUS AT 10 SEC. TP-H1011 A&B

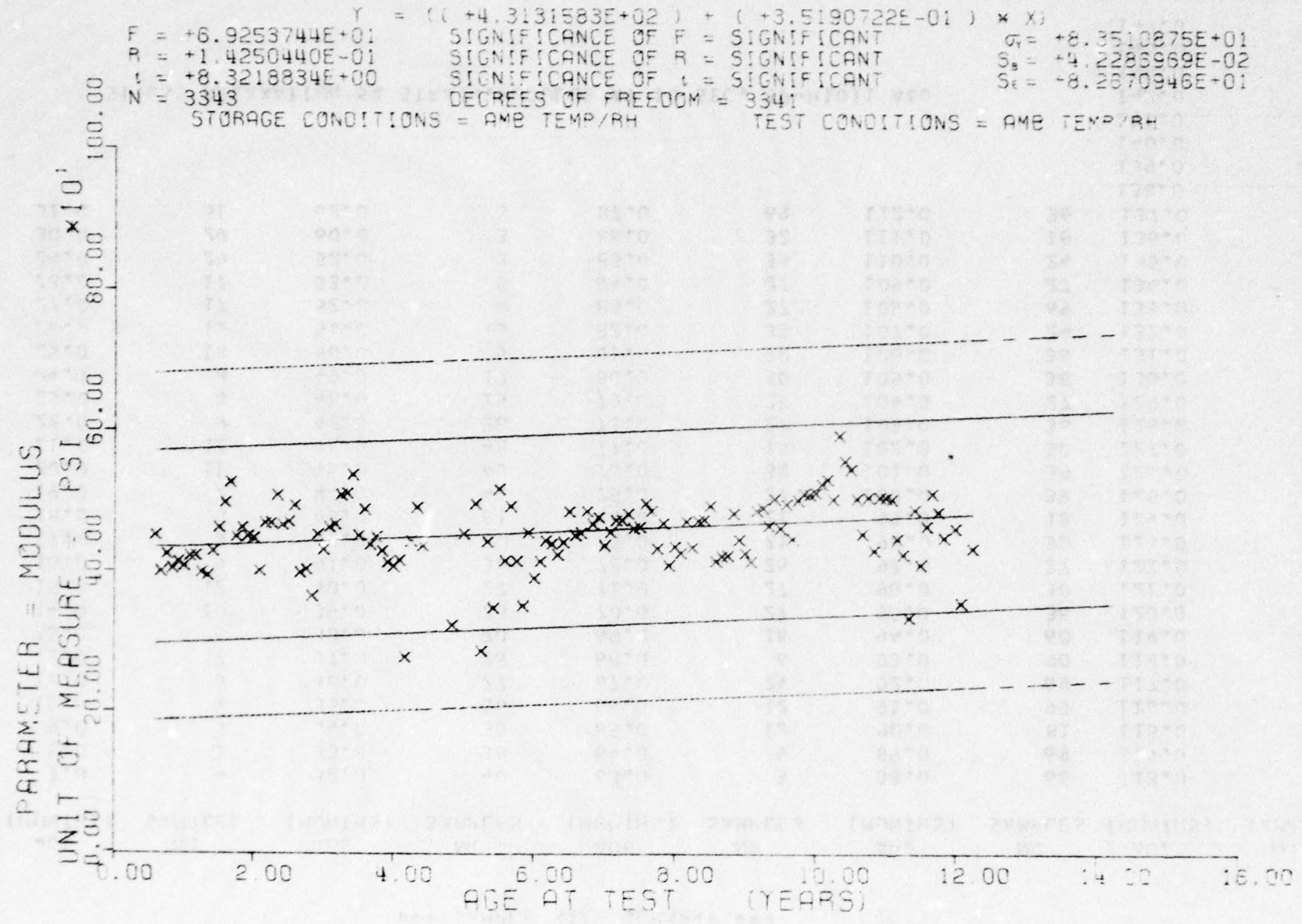

Y = ((+4.3131583E+02) + (+3.5190722E-01) * X)
F = +6.9253744E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +1.4250440E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +8.3218834E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 3343 DEGREES OF FREEDOM = 3341
σY = +8.3510875E+01
Sb = +4.2289969E-02
Sε = +8.2870946E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
×10¹
100.00
80.00
60.00
40.00
20.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 5% STRAIN, MODULUS AT 50 SEC, TP-H1011 A&B

Figure 41

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	40	63.0	3	88.0	66	113.0	18
8.0	3	33.0	38	64.0	9	89.0	69	114.0	33
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33
12.0	7	37.0	26	68.0	6	93.0	90	118.0	18
13.0	8	38.0	20	69.0	18	94.0	60	119.0	33
14.0	10	39.0	23	70.0	27	95.0	36	120.0	36
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15
16.0	9	41.0	38	72.0	26	97.0	27	122.0	8
17.0	6	42.0	80	73.0	21	98.0	30	123.0	12
18.0	8	43.0	61	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21
20.0	11	45.0	40	76.0	38	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41
22.0	9	47.0	36	78.0	27	103.0	36	128.0	37
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21
25.0	18	50.0	5	81.0	20	106.0	36	131.0	21
26.0	13	51.0	15	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9
29.0	29	58.0	3	85.0	33	110.0	24	135.0	12
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9
31.0	51	62.0	3	87.0	69	112.0	36	137.0	18
								138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 5% STRAIN.MODULUS AT 50 SEC. TP-H1011 A&B

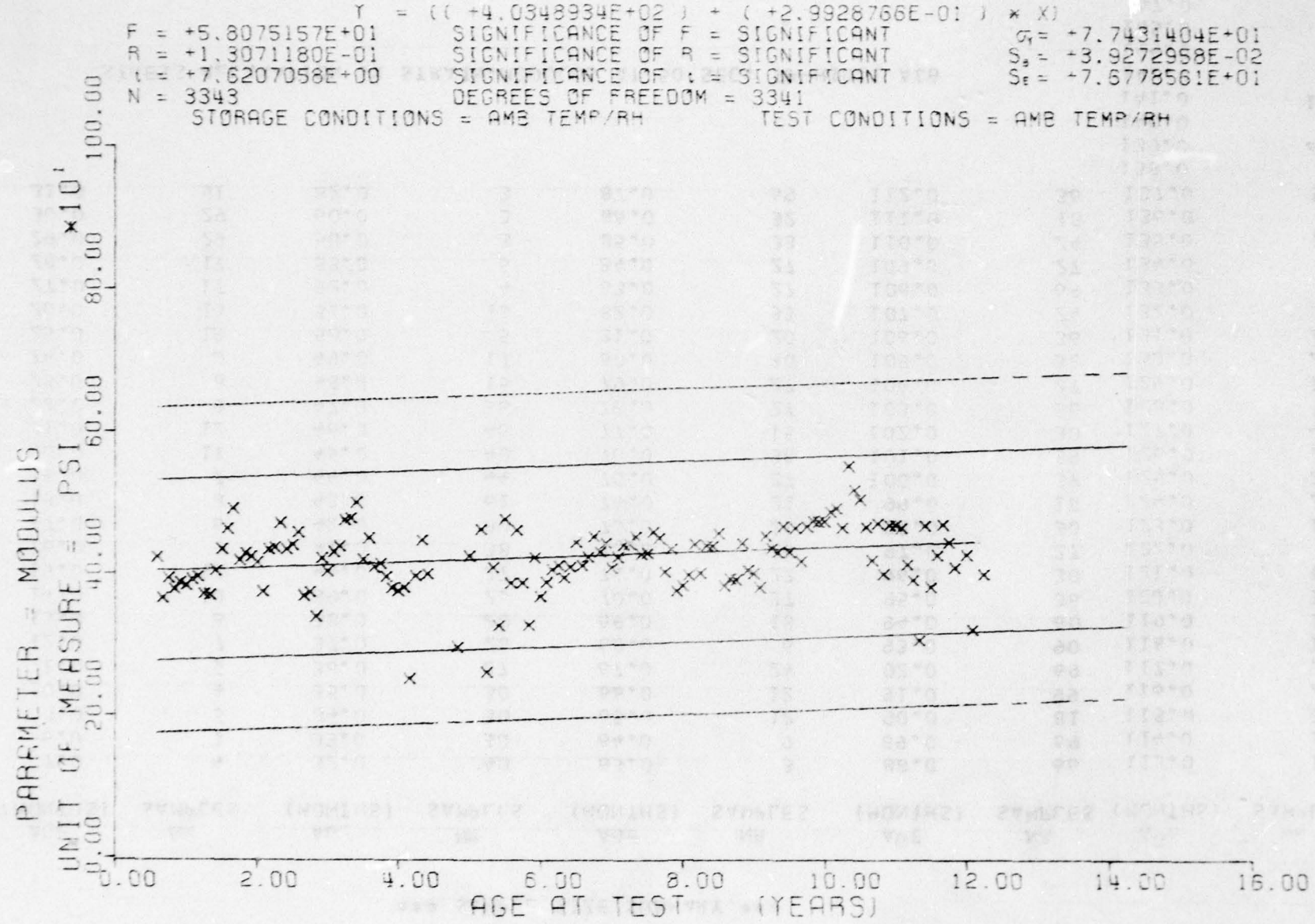

Y = ((+4.0348934E+02) + (+2.9928766E-01) * X)
F = +5.8075157E+01 SIGNIFICANCE OF F = SIGNIFICANT σ1 = +7.7431404E+01
R = +1.3071180E-01 SIGNIFICANCE OF R = SIGNIFICANT Sa = +3.9272958E-02
t = +7.6207058E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +7.6778561E+01
N = 3343 DEGREES OF FREEDOM = 3341
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
*10¹
0.00
20.00
40.00
60.00
80.00
100.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 5% STRAIN, MODULUS AT 100 SEC, TP-H1011 A&B

Figure 42

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	40	63.0	3	88.0	66	113.0	18
8.0	3	33.0	38	64.0	9	89.0	69	114.0	33
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33
12.0	7	37.0	26	68.0	6	93.0	90	118.0	18
13.0	6	38.0	20	69.0	18	94.0	60	119.0	33
14.0	10	39.0	23	70.0	27	95.0	36	120.0	30
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15
16.0	9	41.0	38	72.0	26	97.0	27	122.0	6
17.0	6	42.0	60	73.0	21	98.0	30	123.0	12
18.0	8	43.0	61	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21
20.0	11	45.0	40	76.0	38	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41
22.0	9	47.0	36	78.0	27	103.0	36	128.0	37
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21
25.0	18	50.0	5	81.0	20	106.0	36	131.0	21
26.0	15	51.0	13	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9
29.0	29	58.0	3	85.0	33	110.0	24	135.0	12
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9
31.0	51	62.0	3	87.0	69	112.0	36	137.0	18
								138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION S& STRAIN,MODULUS AT 100 SEC. TP-H1011 A&B

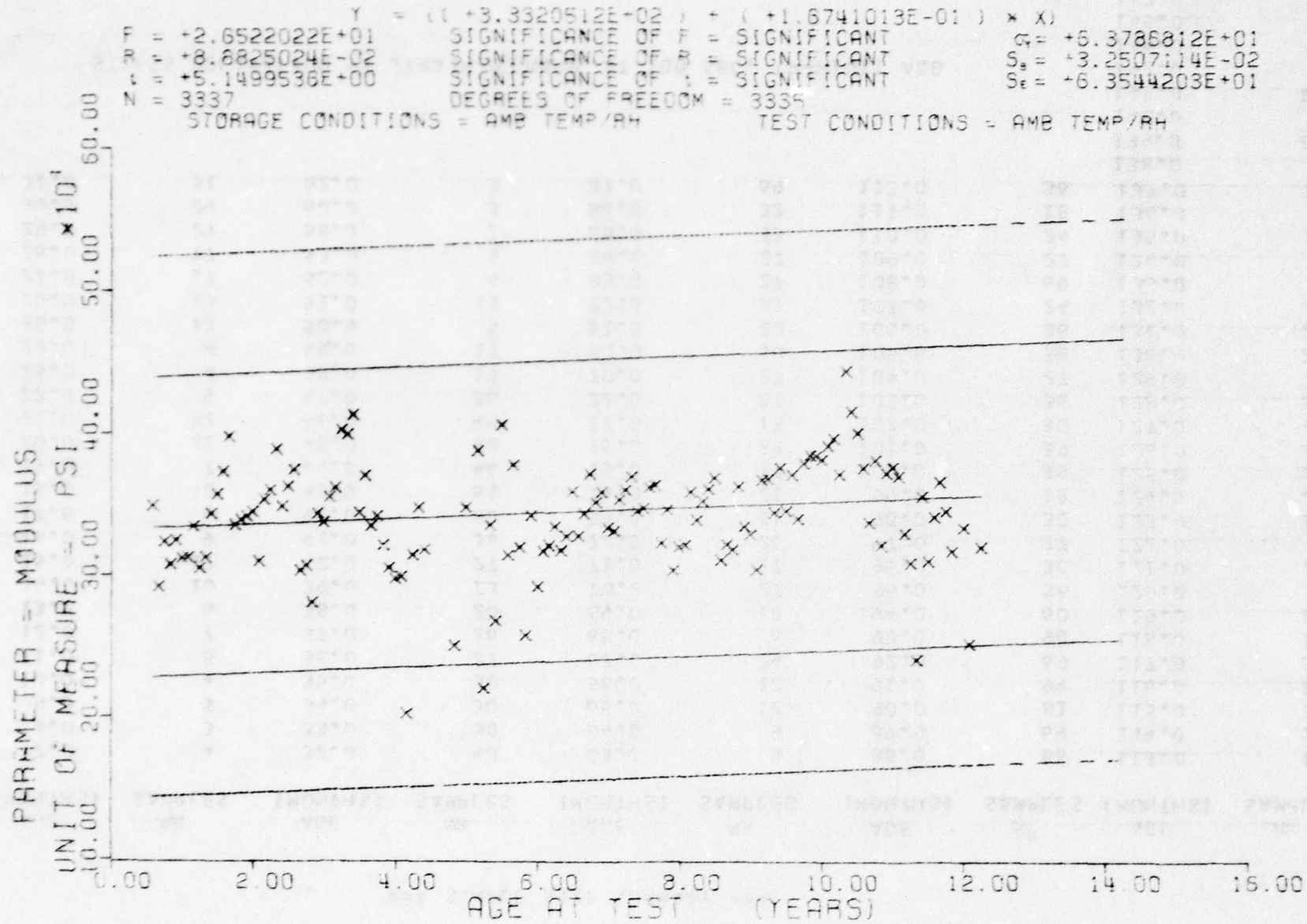

Y = ((+3.3320512E+02) + (+1.6741013E-01) * X)
F = +2.6522022E+01
SIGNIFICANCE OF F = SIGNIFICANT
R = +8.6825024E-02
SIGNIFICANCE OF R = SIGNIFICANT
t = +5.1499536E+00
SIGNIFICANCE OF t = SIGNIFICANT
N = 3337
DEGREES OF FREEDOM = 3335
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
x10¹
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STRESS RELAXATION 5% STRAIN, MODULUS AT 1000 SEC, TP-H1011 A&B

Figure 43

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
7.0	4	32.0	40	63.0	3	88.0	66	113.0	18
8.0	3	33.0	38	64.0	9	89.0	69	114.0	33
9.0	5	34.0	30	65.0	12	90.0	81	115.0	30
10.0	4	35.0	30	66.0	12	91.0	99	116.0	27
11.0	5	36.0	27	67.0	24	92.0	69	117.0	33
12.0	7	37.0	26	68.0	6	93.0	84	118.0	18
13.0	6	38.0	20	69.0	18	94.0	60	119.0	33
14.0	10	39.0	23	70.0	27	95.0	36	120.0	36
15.0	12	40.0	27	71.0	27	96.0	30	121.0	15
16.0	9	41.0	38	72.0	26	97.0	27	122.0	6
17.0	5	42.0	60	73.0	21	98.0	30	123.0	12
18.0	8	43.0	62	74.0	21	99.0	18	124.0	21
19.0	7	44.0	44	75.0	27	100.0	39	125.0	21
20.0	11	45.0	40	76.0	36	101.0	39	126.0	33
21.0	12	46.0	48	77.0	15	102.0	30	127.0	41
22.0	9	47.0	36	78.0	27	103.0	36	128.0	27
23.0	8	48.0	15	79.0	27	104.0	27	129.0	15
24.0	8	49.0	17	80.0	30	105.0	38	130.0	21
25.0	18	50.0	5	81.0	20	106.0	36	131.0	21
26.0	13	51.0	13	82.0	33	107.0	24	132.0	33
27.0	17	52.0	4	83.0	27	108.0	69	133.0	9
28.0	17	53.0	5	84.0	27	109.0	27	134.0	9
29.0	29	58.0	3	85.0	33	110.0	24	135.0	12
30.0	29	60.0	3	86.0	32	111.0	18	136.0	9
31.0	51	62.0	3	87.0	69	112.0	36	137.0	18
								138.0	6
								139.0	21
								140.0	9
								141.0	12
								142.0	9
								144.0	3
								145.0	3
								147.0	6

STRESS RELAXATION 5% STRAIN, MODULUS AT 1000 SEC, TP-H1011 A&B

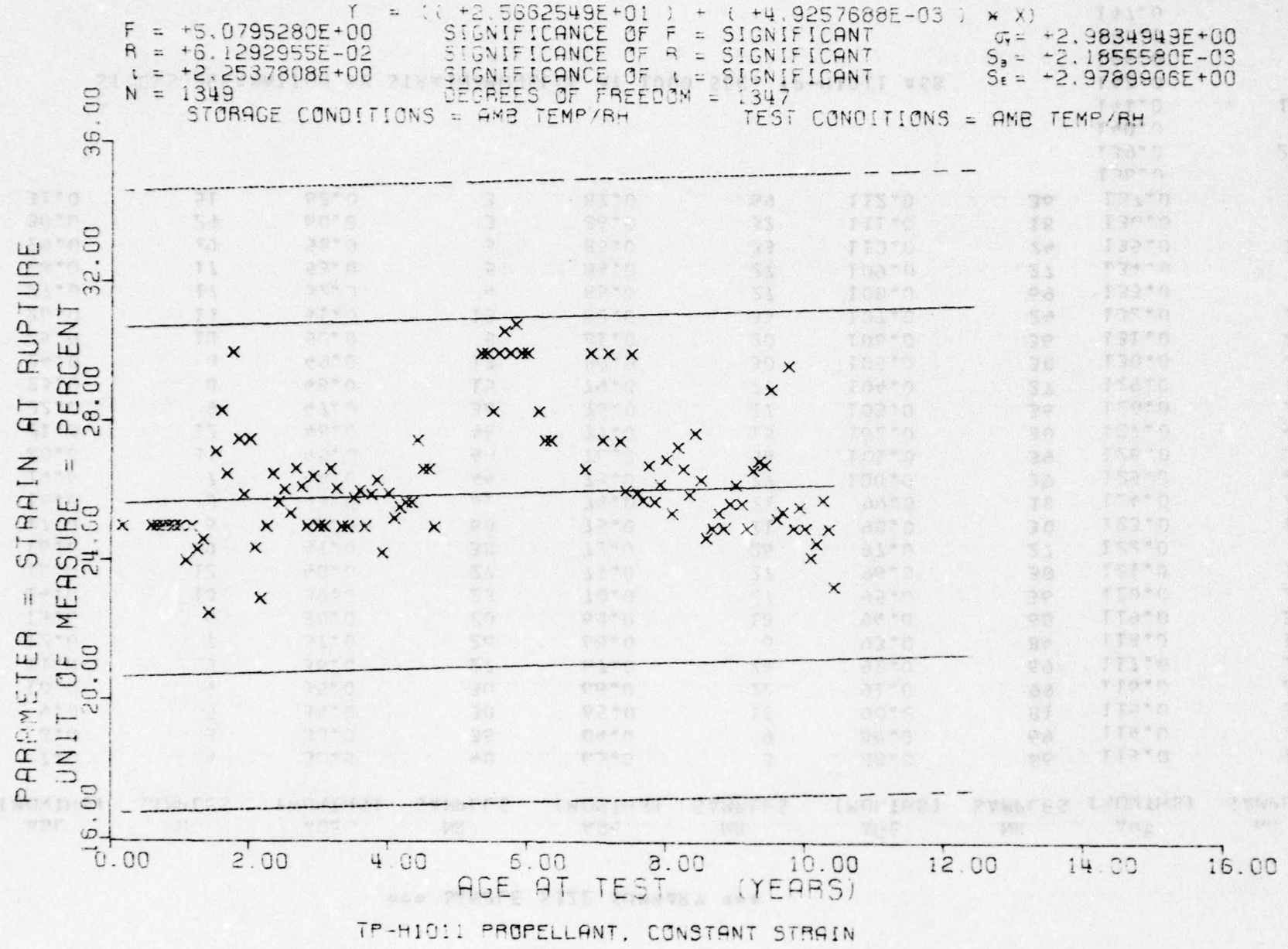
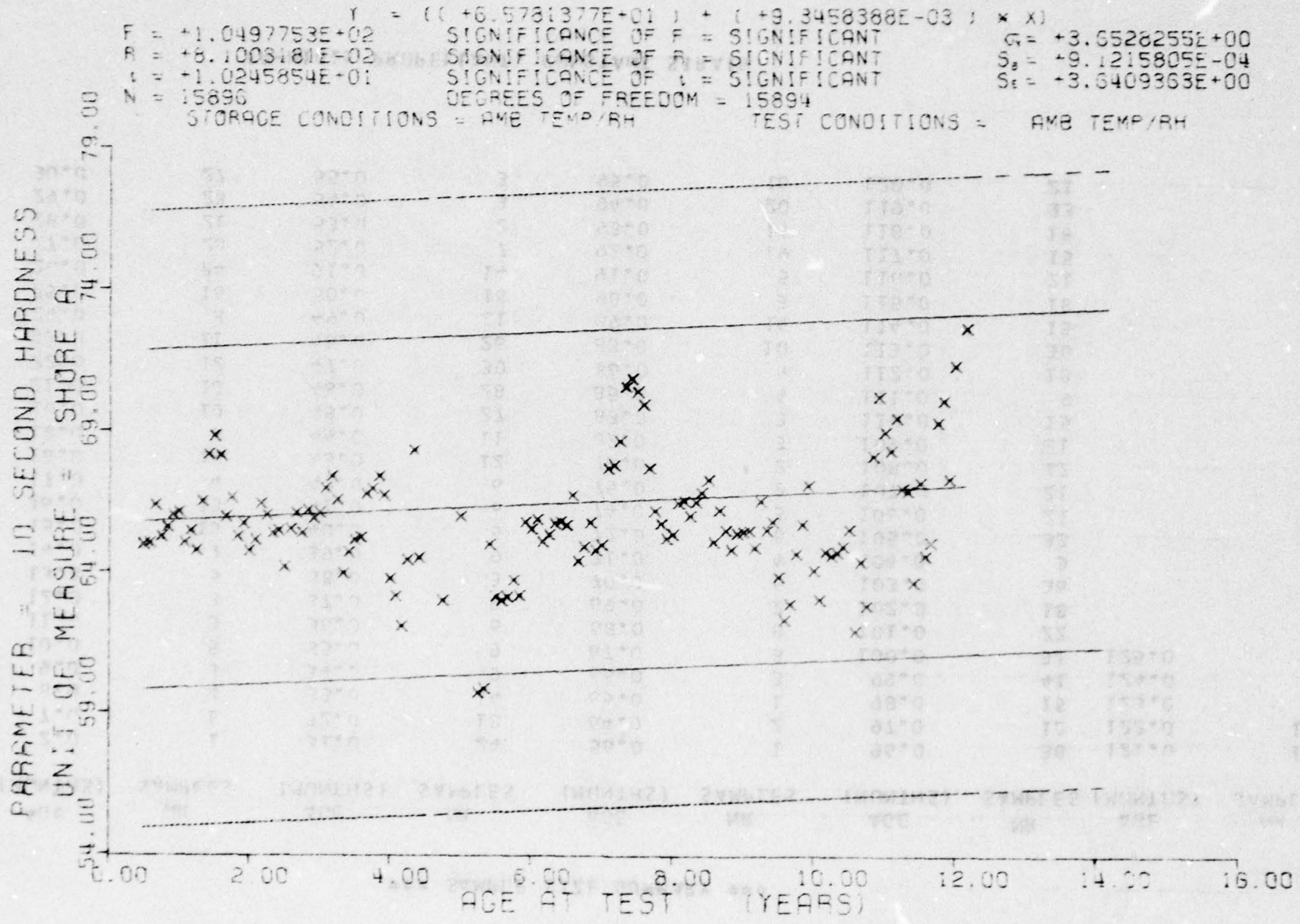

Y = ((+2.5662549E+01) + (+4.9257688E-03) * X)
F = +5.0795280E+00
R = +6.1292955E-02
t = +2.2537808E+00
N = 1349
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 1347
σ = +2.9834949E+00
Sb = +2.1855580E-03
Se = +2.9769906E+00
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PERCENT
16.00
20.00
24.00
28.00
32.00
36.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TP-H1011 PROPELLANT, CONSTANT STRAIN

Figure 44

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
2.0	1	31.0	24	56.0	1	96.0	38	121.0	18
7.0	1	32.0	18	64.0	2	97.0	12	122.0	12
8.0	3	33.0	14	65.0	1	98.0	15	123.0	6
9.0	3	34.0	9	66.0	3	99.0	41	124.0	6
10.0	5	35.0	9	67.0	3	100.0	31	125.0	3
11.0	3	36.0	6	68.0	8	101.0	22		
12.0	3	37.0	9	69.0	2	102.0	18		
13.0	5	38.0	3	70.0	6	103.0	36		
14.0	3	39.0	9	71.0	4	104.0	3		
15.0	15	40.0	5	72.0	6	105.0	33		
16.0	13	41.0	8	74.0	3	106.0	21		
17.0	4	42.0	6	75.0	2	107.0	21		
18.0	14	43.0	12	76.0	2	108.0	12		
19.0	8	44.0	11	82.0	3	109.0	21		
20.0	10	45.0	27	83.0	3	110.0	15		
21.0	10	46.0	28	85.0	4	111.0	9		
22.0	12	47.0	30	86.0	6	112.0	18		
23.0	11	48.0	26	88.0	10	113.0	30		
24.0	8	49.0	21	89.0	14	114.0	15		
25.0	16	50.0	18	90.0	3	115.0	18		
26.0	24	51.0	14	91.0	5	116.0	21		
27.0	28	52.0	7	92.0	19	117.0	15		
28.0	21	53.0	2	93.0	14	118.0	18		
29.0	28	54.0	3	94.0	20	119.0	33		
30.0	27	55.0	3	95.0	16	120.0	21		

TP-H1011 PROPELLANT, CONSTANT STRAIN



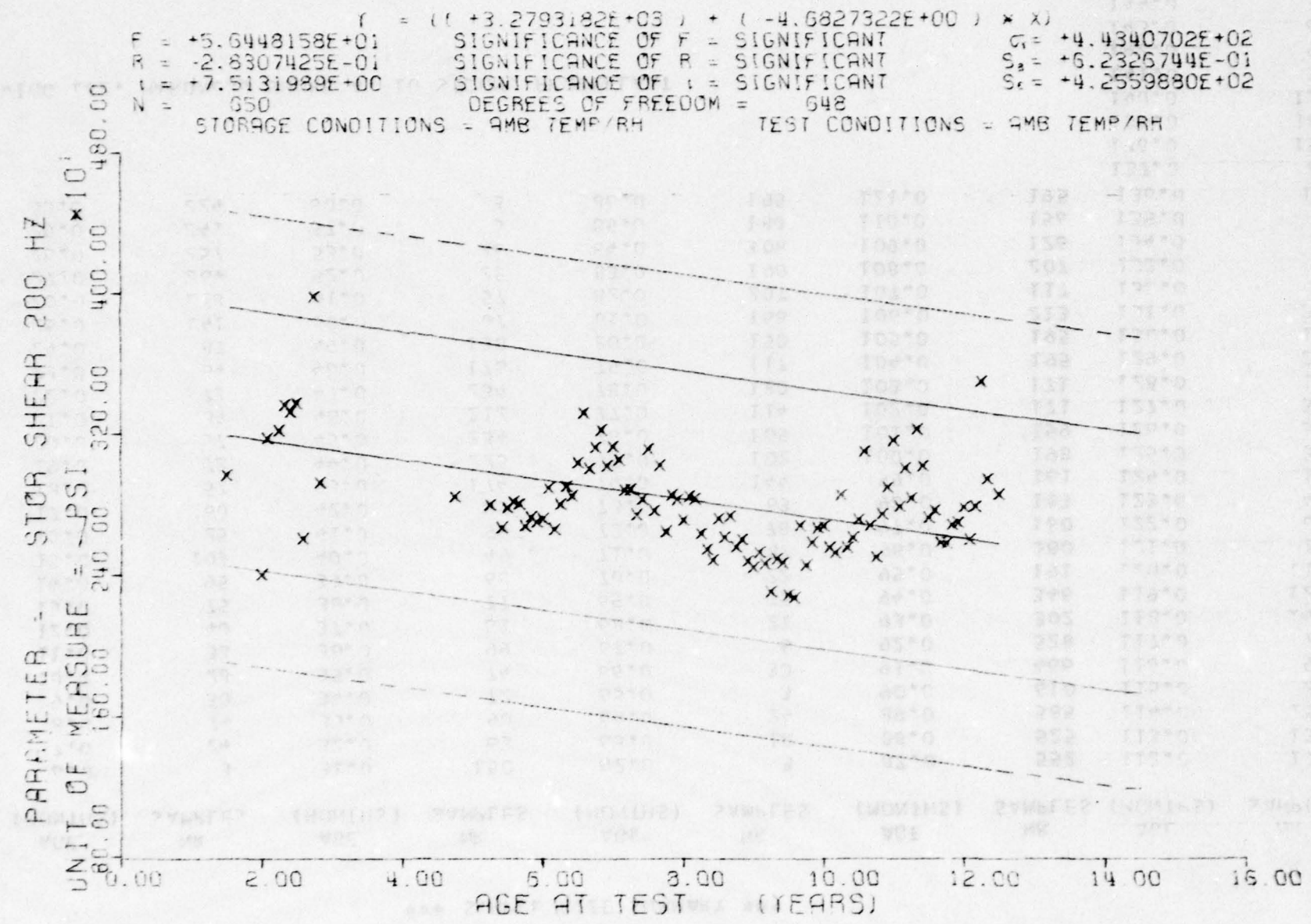
WING 1&2, HARDNESS SHORE A, 10 SECOND PROPELLANT

Figure 45

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLE
6.0	3	31.0	150	62.0	3	87.0	552	112.0	171
7.0	24	32.0	63	63.0	18	88.0	525	113.0	138
8.0	74	33.0	90	64.0	24	89.0	585	114.0	15
9.0	30	34.0	72	65.0	3	90.0	610	115.0	87
10.0	23	35.0	74	66.0	30	91.0	466	116.0	9
11.0	38	36.0	99	67.0	6	92.0	528	117.0	75
12.0	40	37.0	61	68.0	21	93.0	302	118.0	140
13.0	75	38.0	77	69.0	35	94.0	346	119.0	121
14.0	95	39.0	68	70.0	22	95.0	191	120.0	117
15.0	105	40.0	49	71.0	87	96.0	180	121.0	15
16.0	25	41.0	99	72.0	78	97.0	180	122.0	63
17.0	60	42.0	95	73.0	63	98.0	183	123.0	42
18.0	57	43.0	174	74.0	144	99.0	161	124.0	18
19.0	72	44.0	225	75.0	102	100.0	198	125.0	36
20.0	57	45.0	234	76.0	105	101.0	159	126.0	33
21.0	34	46.0	212	77.0	114	102.0	171	127.0	30
22.0	73	47.0	234	78.0	120	103.0	171	128.0	15
23.0	54	48.0	176	79.0	117	104.0	195	129.0	24
24.0	87	49.0	138	80.0	150	105.0	195	130.0	15
25.0	141	50.0	87	81.0	168	106.0	213	131.0	24
26.0	218	51.0	57	82.0	207	107.0	117	132.0	9
27.0	264	52.0	25	83.0	190	108.0	207	133.0	3
28.0	257	53.0	26	84.0	308	109.0	126	134.0	6
29.0	243	57.0	3	85.0	180	110.0	156	135.0	9
30.0	224	60.0	3	86.0	195	111.0	195	136.0	12
								137.0	6
								138.0	15
								139.0	18
								140.0	12
								141.0	3
								142.0	9
								143.0	6
								144.0	3
								146.0	3

WING 182, HARDNESS SHORE A, 10 SECOND PROPELLANT



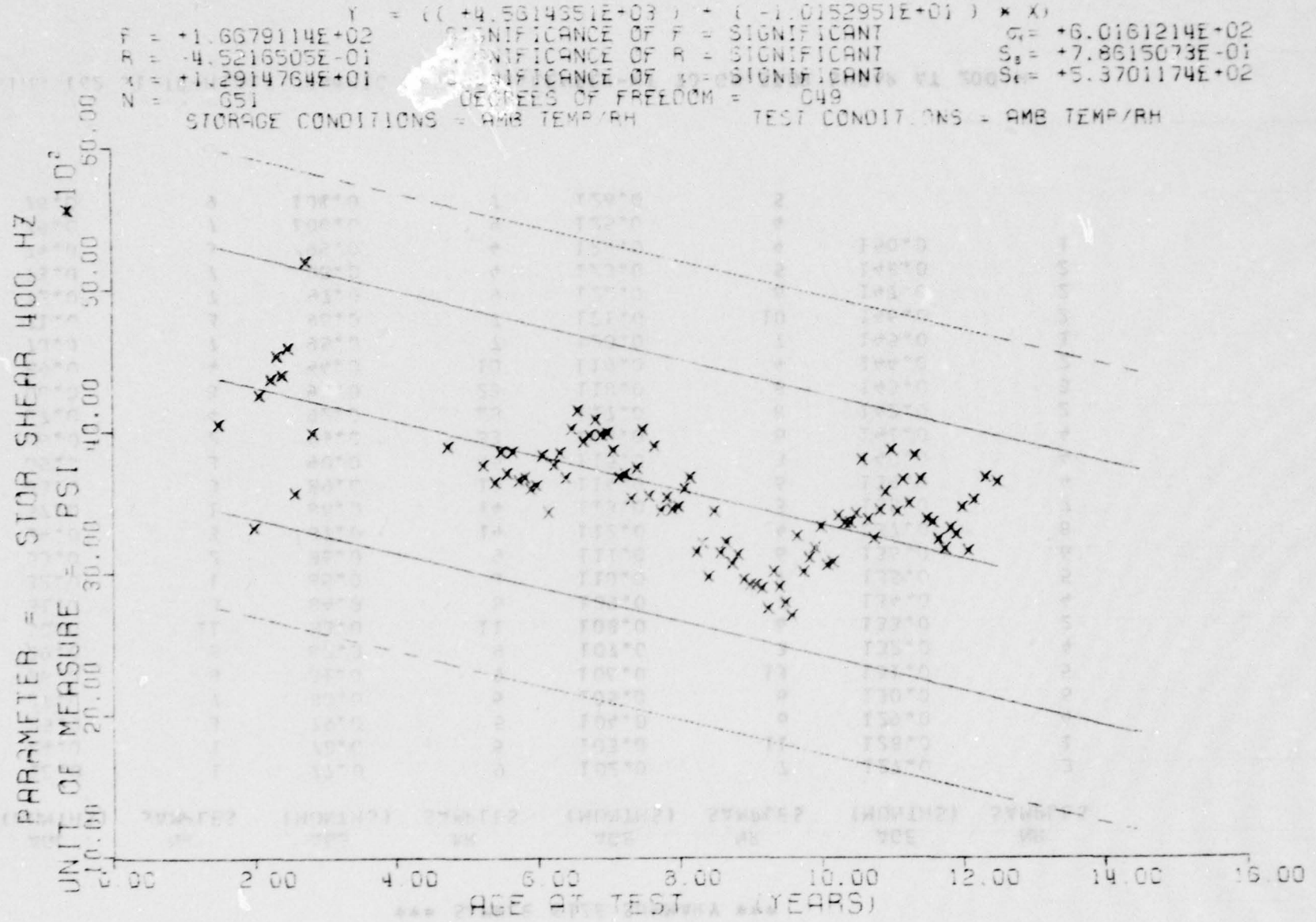
WING 1&2 SI TP-H1011 DYNAMIC RESPONSE, CENTER-WT 70 GM, STOR SHEAR AT 200 HZ

Figure 46

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
10.0	1	77.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	1	80.0	5	105.0	6	130.0	6
28.0	6	81.0	9	106.0	13	131.0	5
29.0	8	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	8	109.0	7	134.0	4
32.0	1	85.0	8	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	3	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	3	138.0	7
63.0	3	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	33	116.0	6	141.0	4
67.0	4	92.0	28	117.0	8	142.0	2
68.0	3	93.0	23	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	10	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	1	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	1	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

WING 182 31 TP-H1011 DYNAMIC RESPONSE.CENTER-WT 70 GM.STOR SHEAR AT 200 H



WING 1&2 51 TP-H1011 DYNAMIC RESPONSE, CENTER-WT 70 GM, STOR SHEAR AT 400 HZ

Figure 47

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
18.0	1	77.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	5	105.0	6	130.0	6
28.0	8	81.0	9	106.0	13	131.0	5
29.0	8	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	5	84.0	8	109.0	7	134.0	4
32.0	1	85.0	6	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	5	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	4	138.0	7
63.0	2	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	33	116.0	6	141.0	4
67.0	4	92.0	28	117.0	8	142.0	2
68.0	3	93.0	23	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	10	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	7	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

WING 1&2 S1 TP-41011 DYNAMIC RESPONSE.CENTER-WT 70 GM.STOR SHEAR AT 400 H

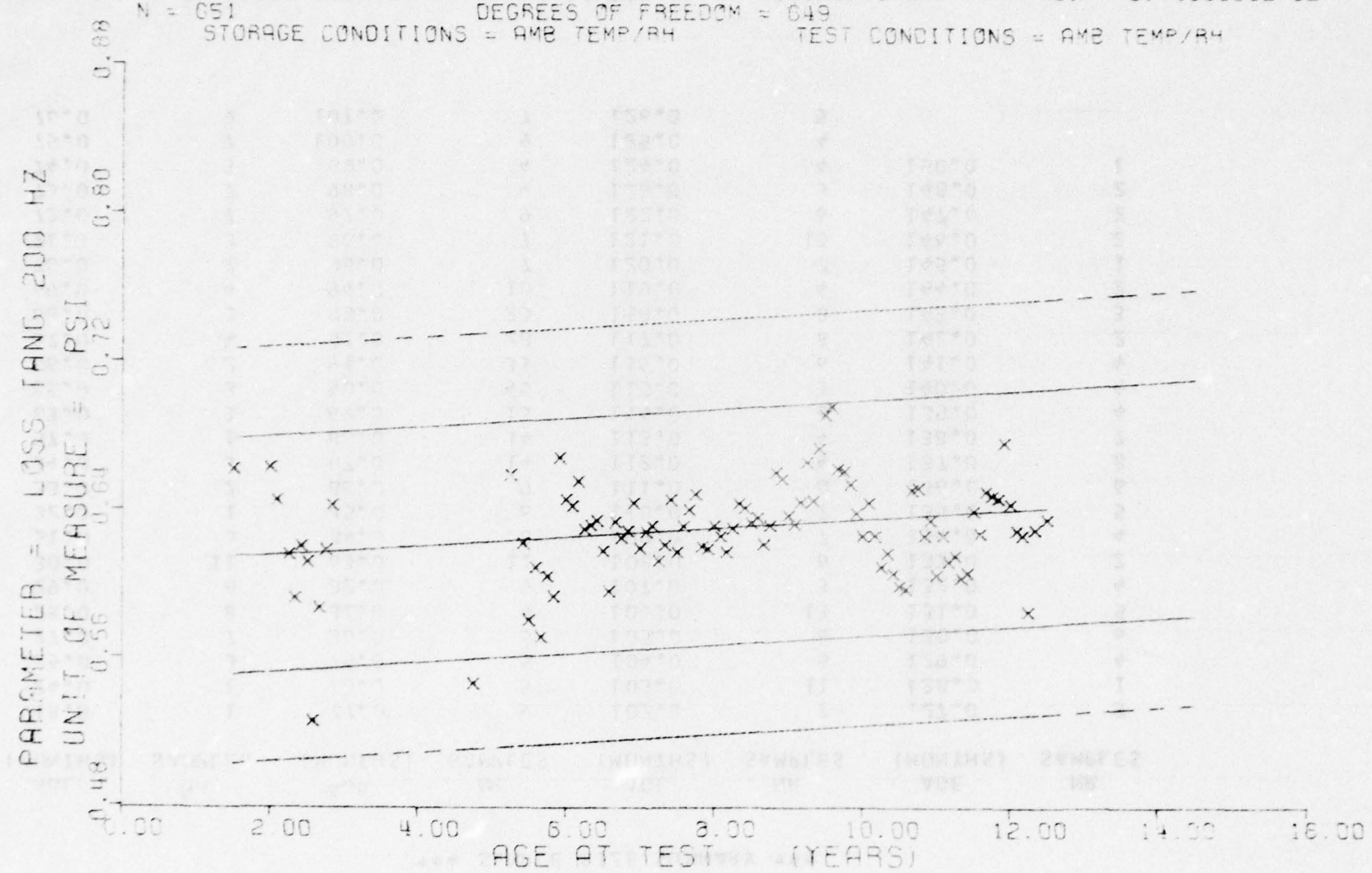
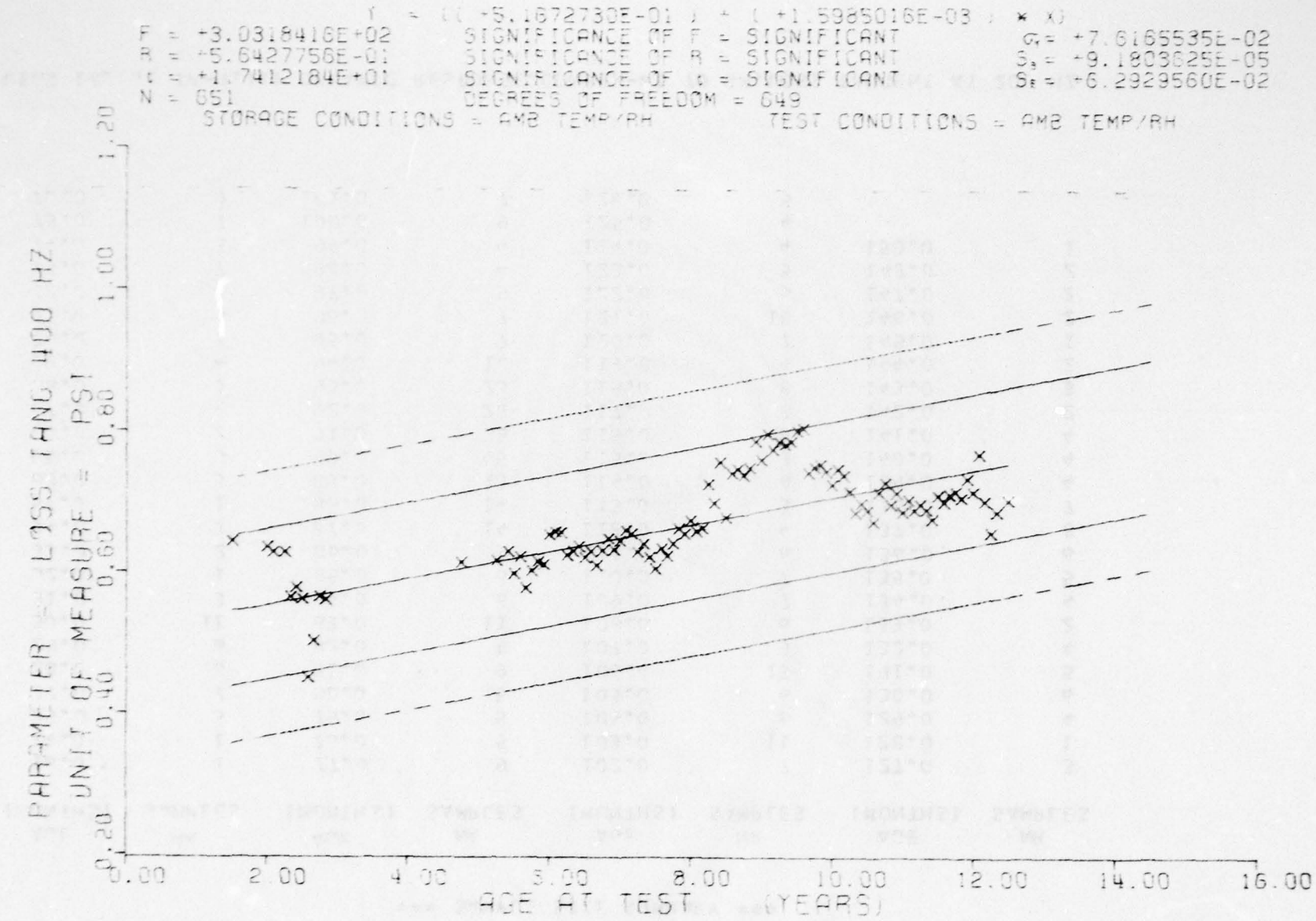

Y = ((+6.1081512E-01) + (+2.0696202E-04) * X)
F = +1.4354786E+01
R = +1.4710432E-01
D = +3.7887710E+00
N = 651
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF D = SIGNIFICANT
DEGREES OF FREEDOM = 649
σ = +3.7841417E-02
Se = +5.4625105E-05
Sr = +3.7458565E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = LOSS TANG 200 HZ
UNIT OF MEASURE = PSI
0.48
0.56
0.64
0.72
0.80
0.88
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 142 S1 TP-H1011 DYNAMIC RESPONSE,CENTER-WT 70 GM,LOSS TANGENT AT 200 HZ

Figure 48

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
18.0	1	77.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	5	105.0	6	130.0	6
28.0	3	81.0	9	106.0	13	131.0	5
29.0	3	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	8	109.0	7	134.0	4
32.0	1	85.0	8	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	3	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	3	138.0	7
63.0	5	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	33	116.0	6	141.0	4
67.0	4	92.0	28	117.0	8	142.0	2
68.0	3	93.0	23	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	10	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	7	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

MIL 182 51 TP-H1011 DYNAMIC RESPONSE, CENTER-WT 70 GM, LOSS TANGENT AT 200 HZ



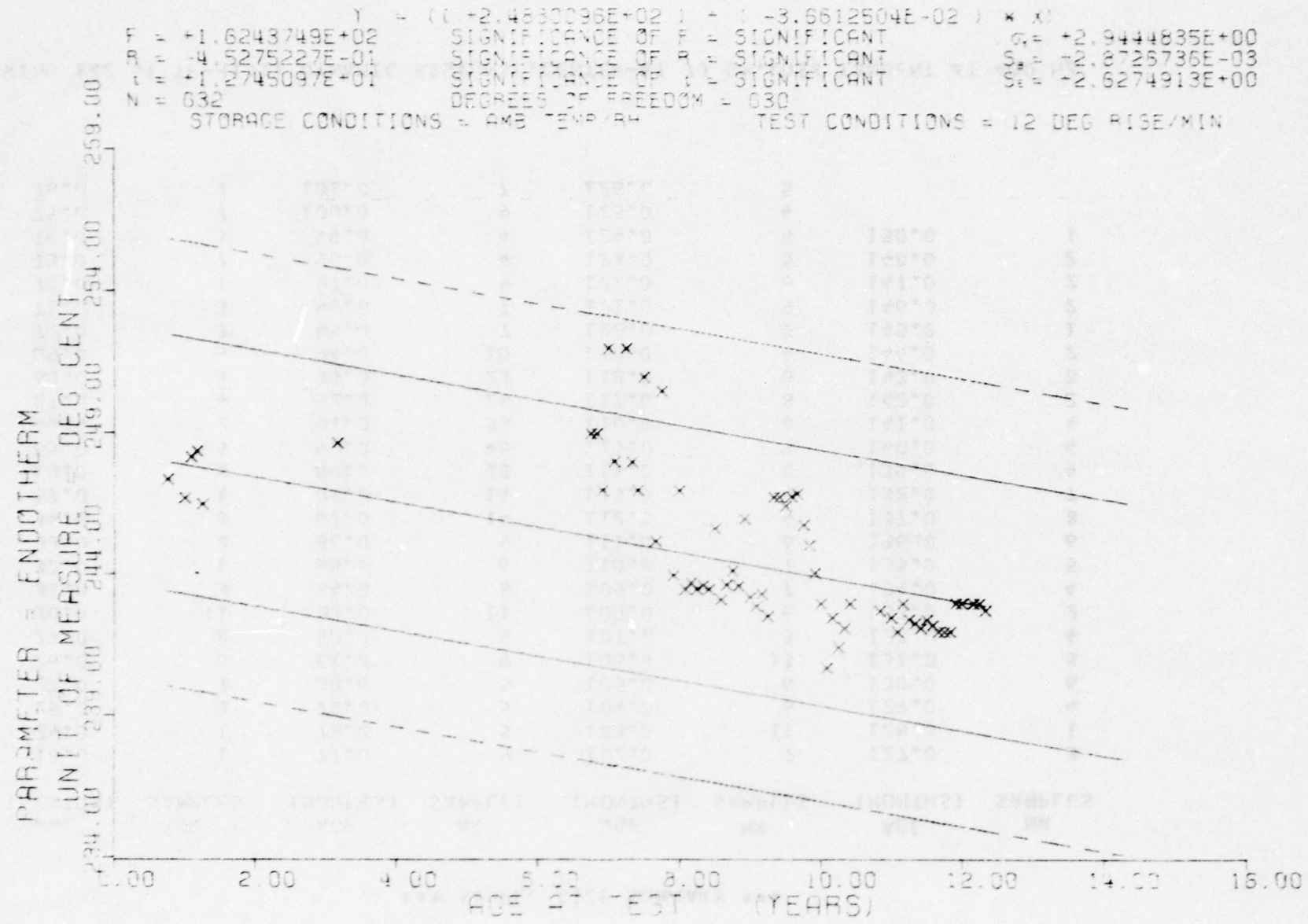
WING 1&2 SI TP-H1011 DYNAMIC RESPONSE, CENTER-WT 70 GM, LOSS TANGENT AT 400 HZ

Figure 49

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
18.0	1	77.0	9	102.0	7	127.0	3
24.0	1	78.0	5	103.0	11	128.0	1
25.0	3	79.0	5	104.0	6	129.0	4
27.0	7	80.0	5	105.0	6	130.0	6
28.0	8	81.0	9	106.0	13	131.0	5
29.0	8	82.0	9	107.0	3	132.0	4
30.0	11	83.0	11	108.0	6	133.0	2
31.0	3	84.0	8	109.0	7	134.0	4
32.0	1	85.0	6	110.0	7	135.0	5
33.0	2	86.0	9	111.0	6	136.0	6
34.0	3	87.0	14	112.0	4	137.0	8
57.0	1	88.0	14	113.0	4	138.0	7
63.0	3	89.0	13	114.0	6	139.0	4
65.0	3	90.0	45	115.0	3	140.0	4
66.0	2	91.0	35	116.0	6	141.0	4
67.0	4	92.0	28	117.0	8	142.0	2
68.0	3	93.0	23	118.0	8	143.0	3
69.0	4	94.0	10	119.0	4	144.0	2
70.0	7	95.0	7	120.0	7	145.0	1
71.0	3	96.0	7	121.0	9	146.0	2
72.0	7	97.0	9	122.0	6	147.0	2
73.0	7	98.0	4	123.0	5	148.0	2
74.0	3	99.0	4	124.0	4	150.0	1
75.0	7	100.0	9	125.0	4		
76.0	9	101.0	7	126.0	5		

WING 1&2 51 TP-H1011 DYNAMIC RESPONSE,CENTER-WT 70 GM,LOSS TANGENT AT 400 HZ



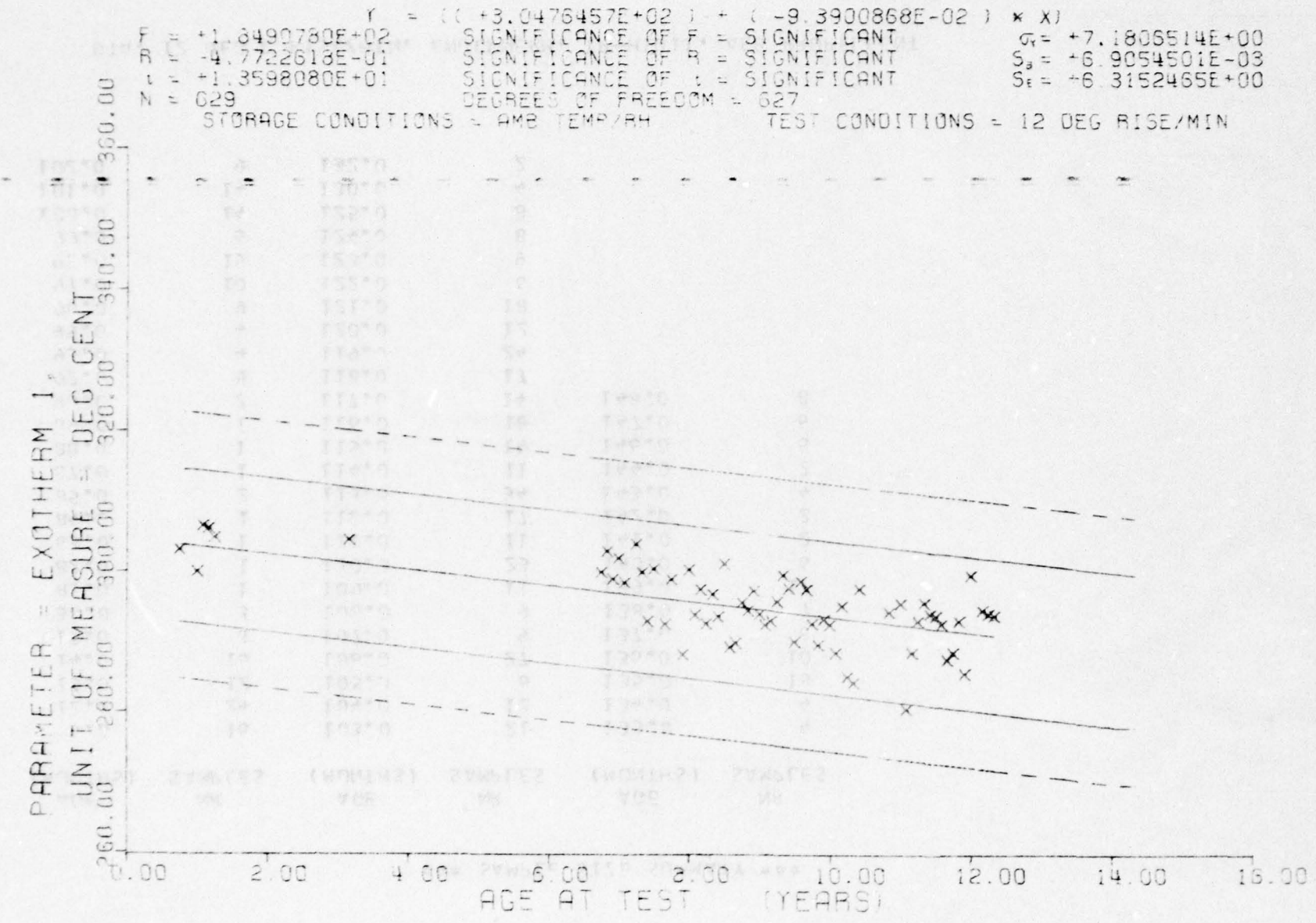
DTA, 12 DEG C RISE/MIN, ENDOTHERM, TP-H1011, A&B PROPELLENT

Figure 50

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	16	103.0	21	133.0	4
12.0	24	104.0	12	134.0	4
13.0	12	105.0	6	135.0	16
14.0	15	106.0	27	136.0	10
15.0	3	107.0	9	137.0	8
36.0	3	108.0	9	138.0	7
81.0	1	109.0	11	139.0	17
82.0	1	110.0	23	140.0	6
83.0	1	111.0	11	141.0	2
84.0	1	112.0	17	142.0	2
85.0	2	113.0	34	143.0	4
87.0	1	114.0	11	144.0	2
88.0	1	115.0	19	146.0	6
89.0	1	116.0	18	147.0	6
90.0	2	117.0	14	148.0	8
92.0	5	118.0	17		
93.0	4	119.0	24		
95.0	4	120.0	12		
96.0	9	121.0	18		
97.0	10	122.0	6		
98.0	15	123.0	9		
99.0	5	124.0	8		
100.0	14	125.0	8		
101.0	14	130.0	4		
102.0	9	132.0	2		

DTA, 12 DEG C RISE/MIN, ENDOTHERM, TP-H1011, A&B PROPELLENT



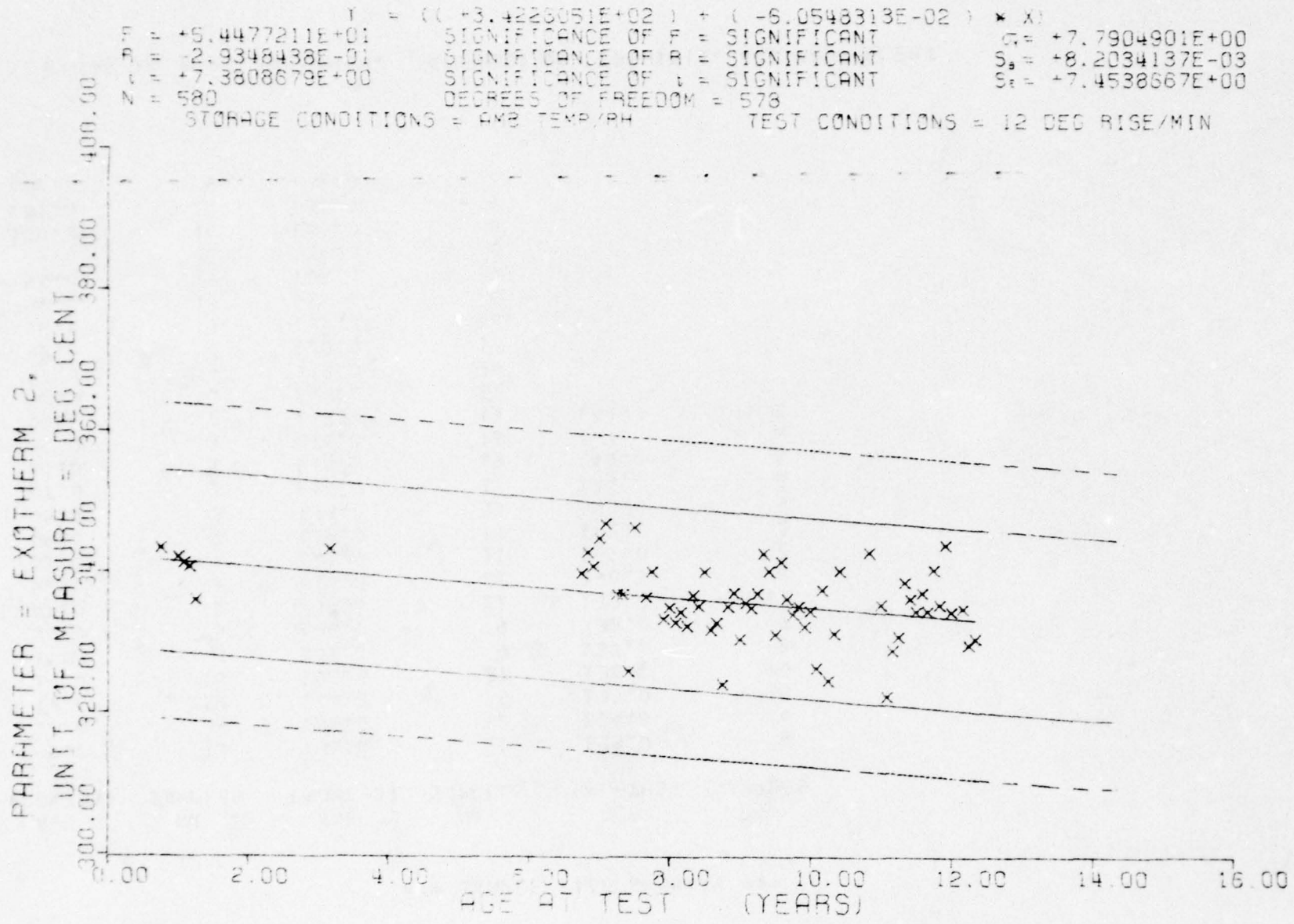
OTA, 12 DEG C RISE/MIN, EXOTHERM =1, TP-H1011, A&B PROPELLENT

Figure 51

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	15	103.0	21	133.0	4
12.0	24	104.0	12	134.0	4
13.0	12	105.0	6	135.0	16
14.0	15	106.0	27	136.0	10
15.0	3	107.0	9	137.0	8
30.0	3	108.0	9	138.0	7
81.0	1	109.0	11	139.0	17
82.0	1	110.0	21	140.0	6
83.0	1	111.0	11	141.0	2
84.0	1	112.0	17	142.0	2
85.0	2	113.0	33	143.0	4
87.0	1	114.0	11	144.0	2
88.0	1	115.0	19	146.0	6
89.0	1	116.0	18	147.0	6
90.0	2	117.0	14	148.0	8
92.0	5	118.0	17		
93.0	4	119.0	24		
95.0	4	120.0	12		
96.0	9	121.0	18		
97.0	10	122.0	6		
98.0	15	123.0	9		
99.0	5	124.0	8		
100.0	14	125.0	8		
101.0	14	130.0	4		
102.0	9	132.0	2		

DTA, 12 DEG C RISE/MIN, EXOTHERM #1, TP-H1011, A&B PROPELLENT



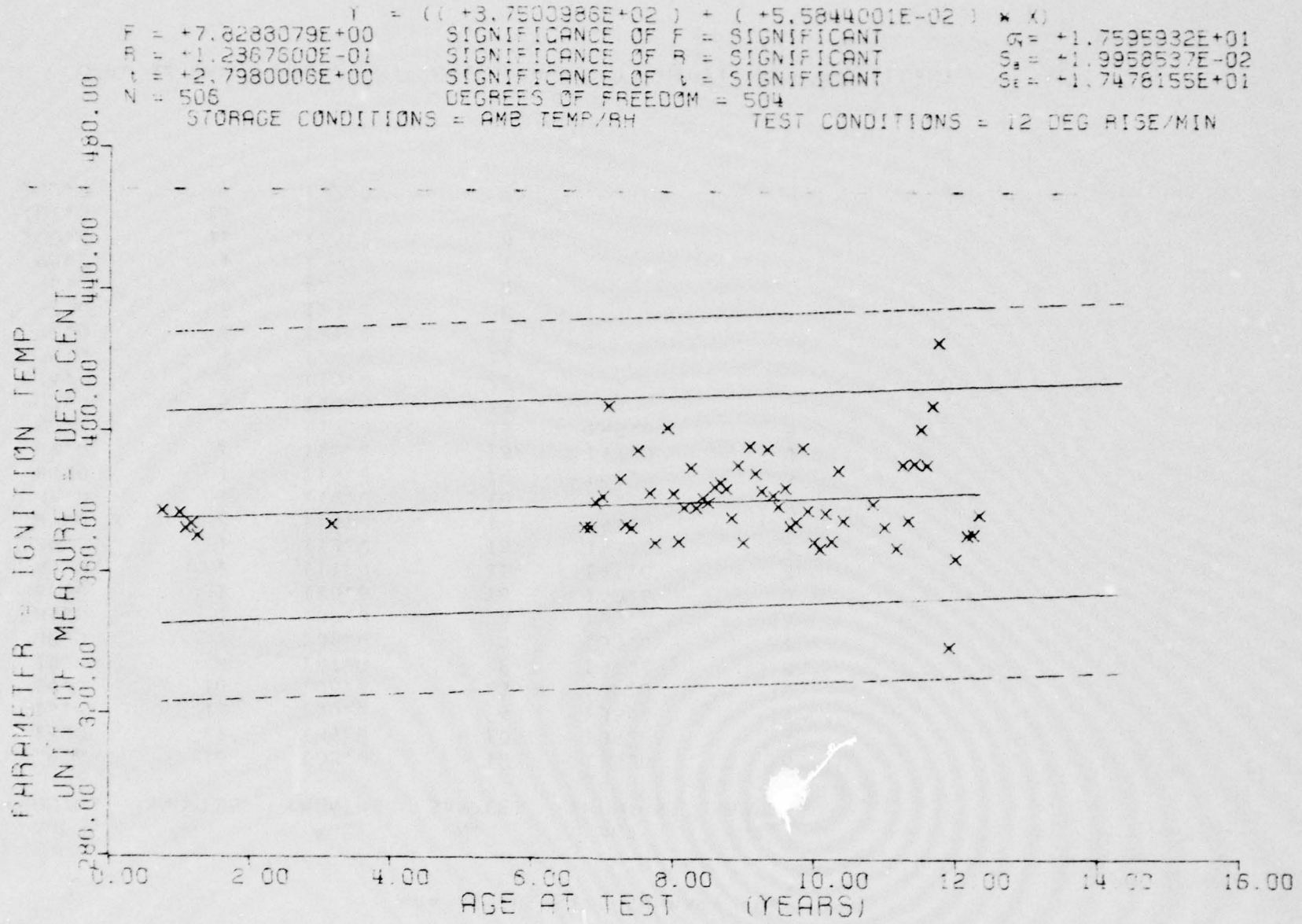
DTA, 12 DEG C RISE/MIN. EXOTHERM =2, TP-H1011, A&B PROPELLENT

Figure 52

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	16	103.0	18	133.0	4
12.0	24	104.0	10	134.0	4
13.0	12	105.0	4	135.0	15
14.0	16	106.0	23	136.0	10
15.0	6	107.0	8	137.0	8
38.0	3	108.0	9	138.0	7
81.0	1	109.0	8	139.0	16
82.0	1	110.0	18	140.0	5
83.0	1	111.0	11	141.0	2
84.0	1	112.0	15	142.0	2
85.0	2	113.0	34	143.0	2
87.0	1	114.0	10	144.0	2
88.0	1	115.0	19	146.0	6
89.0	1	116.0	18	147.0	6
90.0	2	117.0	13	148.0	8
92.0	5	118.0	13		
93.0	4	119.0	22		
95.0	4	120.0	12		
96.0	6	121.0	18		
97.0	7	122.0	6		
98.0	12	123.0	8		
99.0	4	124.0	7		
100.0	11	125.0	8		
101.0	13	130.0	4		
102.0	9	132.0	2		

DTA, 12 DEG C RISE/MIN, EXOTHERM #2, TP-H1011, A&B PROPELLENT



DTA, 12 DEG C RISE/MIN, IGNITION, TP-H1011, A&B PROPELLENT

Figure 53

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	16	103.0	20	134.0	2
12.0	24	104.0	11	135.0	9
13.0	12	105.0	6	136.0	7
14.0	16	106.0	23	137.0	5
15.0	8	107.0	9	138.0	5
38.0	3	108.0	9	139.0	12
81.0	1	109.0	7	140.0	3
82.0	1	110.0	15	141.0	2
83.0	1	111.0	7	143.0	2
84.0	1	112.0	14	144.0	2
85.0	2	113.0	23	146.0	4
87.0	1	114.0	8	147.0	5
88.0	1	115.0	17	148.0	8
89.0	1	116.0	16		
90.0	2	117.0	10		
92.0	4	118.0	11		
93.0	4	119.0	18		
95.0	2	120.0	5		
96.0	9	121.0	17		
97.0	10	122.0	3		
98.0	15	123.0	7		
99.0	4	124.0	5		
100.0	12	125.0	8		
101.0	8	130.0	2		
102.0	9	132.0	2		

DTA, 12 DEG C RISE/MIN, IGNITION, TP-H1011, A&B PROPELLENT

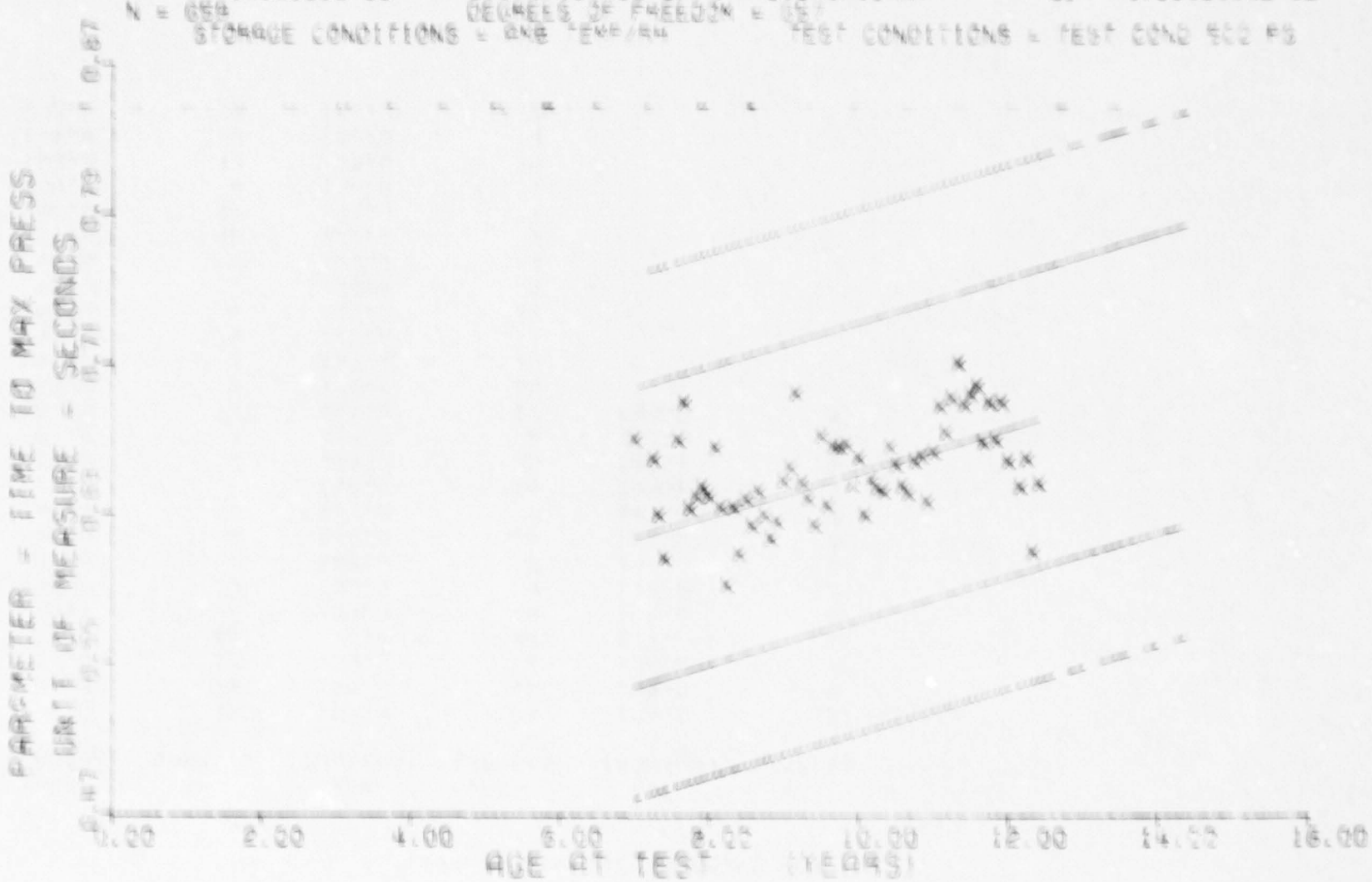
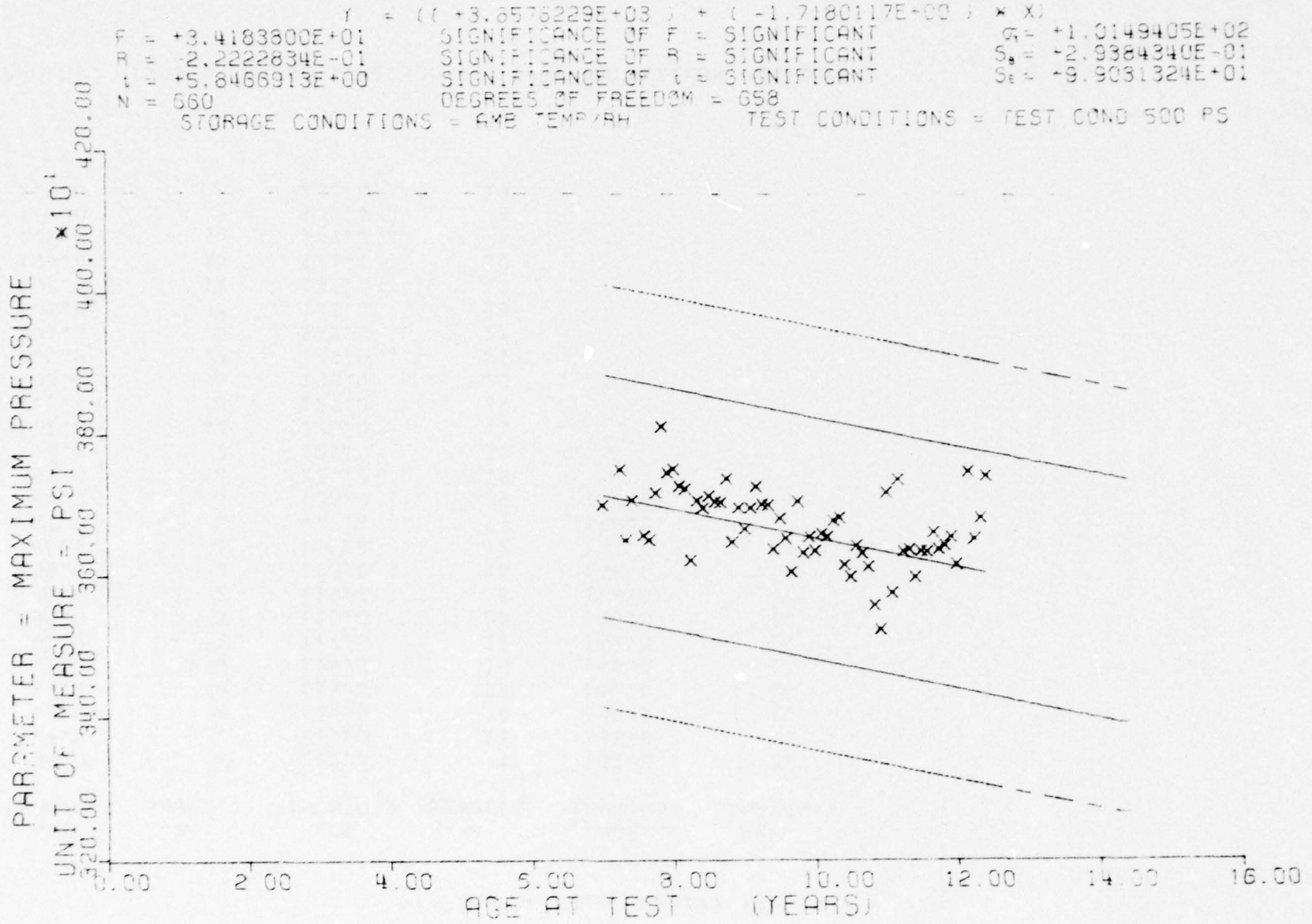

PARAMETER = TIME TO MAX PRESS
UNIT OF MEASURE = SECONDS
AGE AT TEST (YEARS)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

Figure 54

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
84.0	2	112.0	9	137.0	26
87.0	1	113.0	11	138.0	9
88.0	2	114.0	4	139.0	11
89.0	3	115.0	25	140.0	14
91.0	3	116.0	15	141.0	12
92.0	1	117.0	17	142.0	6
93.0	3	118.0	23	143.0	10
94.0	2	119.0	18	144.0	7
95.0	2	120.0	16	146.0	4
96.0	1	121.0	12	147.0	2
97.0	3	122.0	7	148.0	2
98.0	3	123.0	24	149.0	3
99.0	8	124.0	15		
100.0	7	125.0	30		
101.0	10	126.0	15		
102.0	8	127.0	39		
103.0	3	128.0	30		
104.0	10	129.0	21		
105.0	6	130.0	21		
106.0	7	131.0	18		
107.0	11	132.0	12		
108.0	16	133.0	10		
109.0	10	134.0	5		
110.0	4	135.0	4		
111.0	4	136.0	10		

TP-H1011 STAGE 1, PRESS TIME,500 PSI TIME TO MAXIMUM PRESSURE



TP-H1011 STAGE 1, PRESS TIME,500 PSI MAXIMUM PRESSURE

Figure 55

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
84.0	2	112.0	9	137.0	26
87.0	1	113.0	11	138.0	9
88.0	2	114.0	4	139.0	11
89.0	3	115.0	25	140.0	14
91.0	3	116.0	15	141.0	12
92.0	1	117.0	17	142.0	6
93.0	3	118.0	23	143.0	10
94.0	2	119.0	18	144.0	7
95.0	2	120.0	16	146.0	4
96.0	1	121.0	12	147.0	2
97.0	5	122.0	7	148.0	2
98.0	5	123.0	24	149.0	3
99.0	8	124.0	15		
100.0	7	125.0	30		
101.0	10	126.0	15		
102.0	3	127.0	39		
103.0	5	128.0	30		
104.0	10	129.0	21		
105.0	6	130.0	21		
106.0	7	131.0	18		
107.0	11	132.0	12		
108.0	15	133.0	11		
109.0	16	134.0	5		
110.0	4	135.0	4		
111.0	4	136.0	10		

TP-H1011 STAGE 1, PRESS TIME,500 PSI MAXIMUM PRESSURE

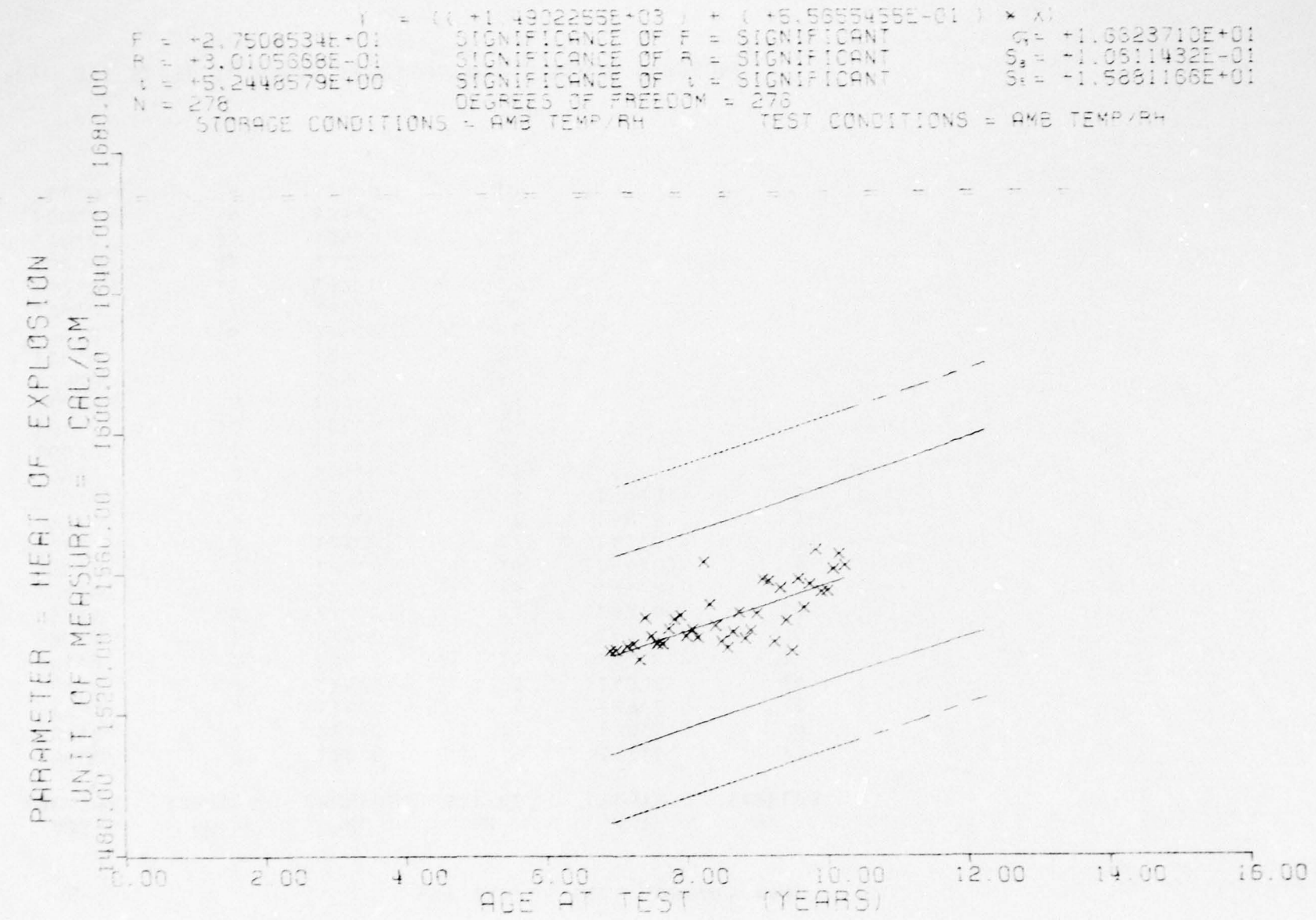
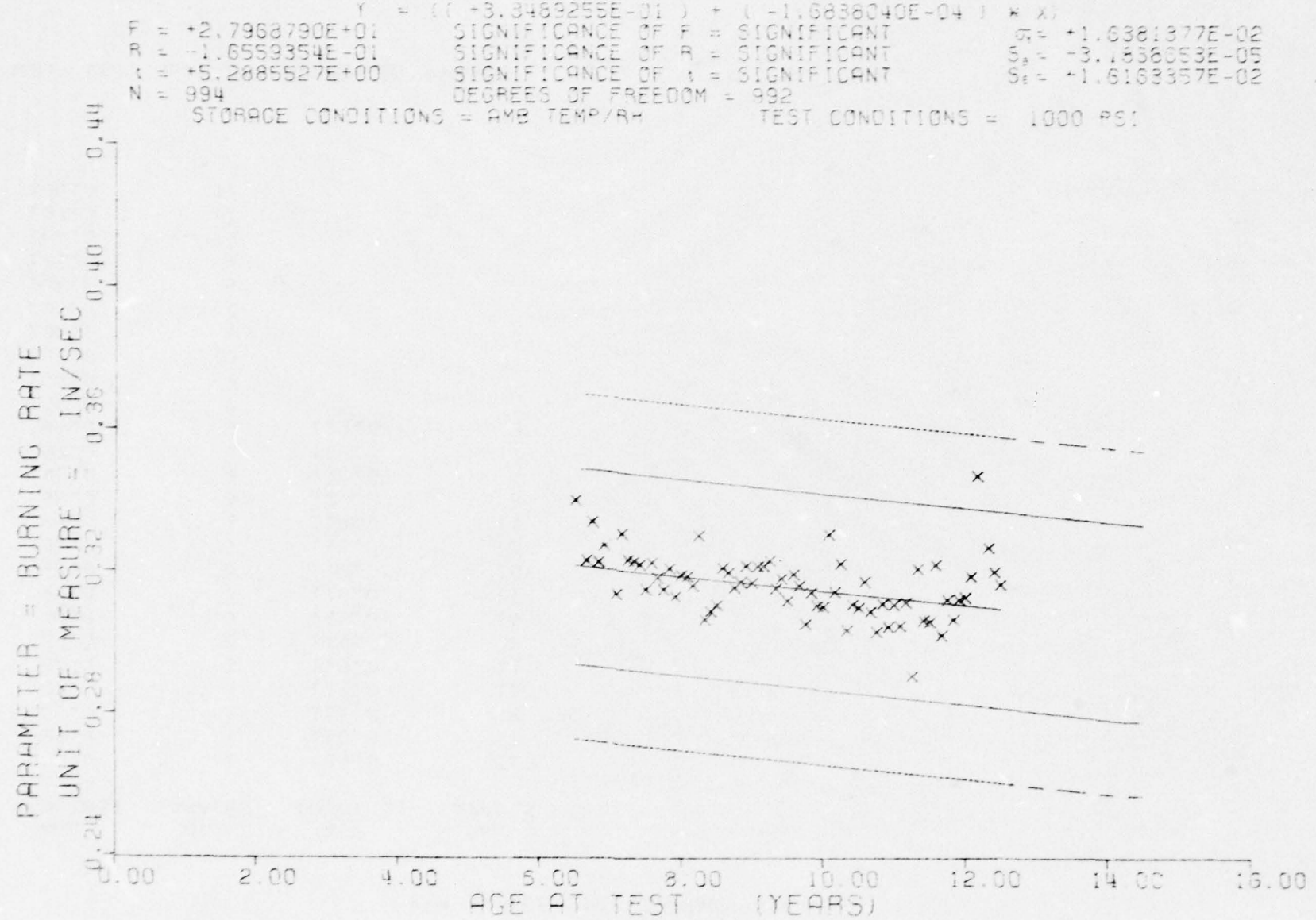

Y = ((+1.49022555E+03) + (+5.56554555E-01) * X)
F = +2.7508534E+01
R = +3.0105668E-01
t = +5.2448579E+00
N = 278
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 276
$S_{\hat{Y}}$ = +1.6623710E+01
S_b = +1.0511432E-01
S_t = +1.5681166E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = HEAT OF EXPLOSION
UNIT OF MEASURE = CAL/GM
1480.00
1520.00
1560.00
1600.00
1640.00
1680.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 142, HEAT OF EXPLOSION, TPH-1011

Figure 56

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NK SAMPLES	AGE (MONTHS)	NK SAMPLES
83.0	1	109.0	12
84.0	1	110.0	7
86.0	1	111.0	8
87.0	2	112.0	11
88.0	1	113.0	11
89.0	2	114.0	7
90.0	5	115.0	14
91.0	3	116.0	11
92.0	2	117.0	16
93.0	5	118.0	12
94.0	5	119.0	11
95.0	3	120.0	8
96.0	3	121.0	4
97.0	5	122.0	7
98.0	5	123.0	3
99.0	7		
100.0	9		
101.0	10		
102.0	9		
103.0	7		
104.0	8		
105.0	9		
106.0	6		
107.0	12		
108.0	17		

WING 162, HEAT OF EXPLOSION, TPH-1011



STAGE 1, WING A42, TP-H1011, BURNING RATE 1000 PSI

Figure 57

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
78.0	3	105.0	21	130.0	24
80.0	8	106.0	18	131.0	15
81.0	3	107.0	21	132.0	12
82.0	3	108.0	18	133.0	17
83.0	9	109.0	15	134.0	9
85.0	3	110.0	9	135.0	3
86.0	3	111.0	24	136.0	21
87.0	9	112.0	27	137.0	27
88.0	12	113.0	21	138.0	18
89.0	6	114.0	21	139.0	24
90.0	3	115.0	18	140.0	12
91.0	14	116.0	18	141.0	15
92.0	15	117.0	45	142.0	9
93.0	3	118.0	21	143.0	9
94.0	3	119.0	18	144.0	6
95.0	12	120.0	21	145.0	6
96.0	9	121.0	18	146.0	3
97.0	3	122.0	18	147.0	3
98.0	9	123.0	15	148.0	9
99.0	6	124.0	21	149.0	3
100.0	6	125.0	24	150.0	3
101.0	15	126.0	29		
102.0	18	127.0	20		
103.0	18	128.0	36		
104.0	15	129.0	21		

STAGE 1, WING A&B, TP-H1011, BURNING RATE 1000 PSI

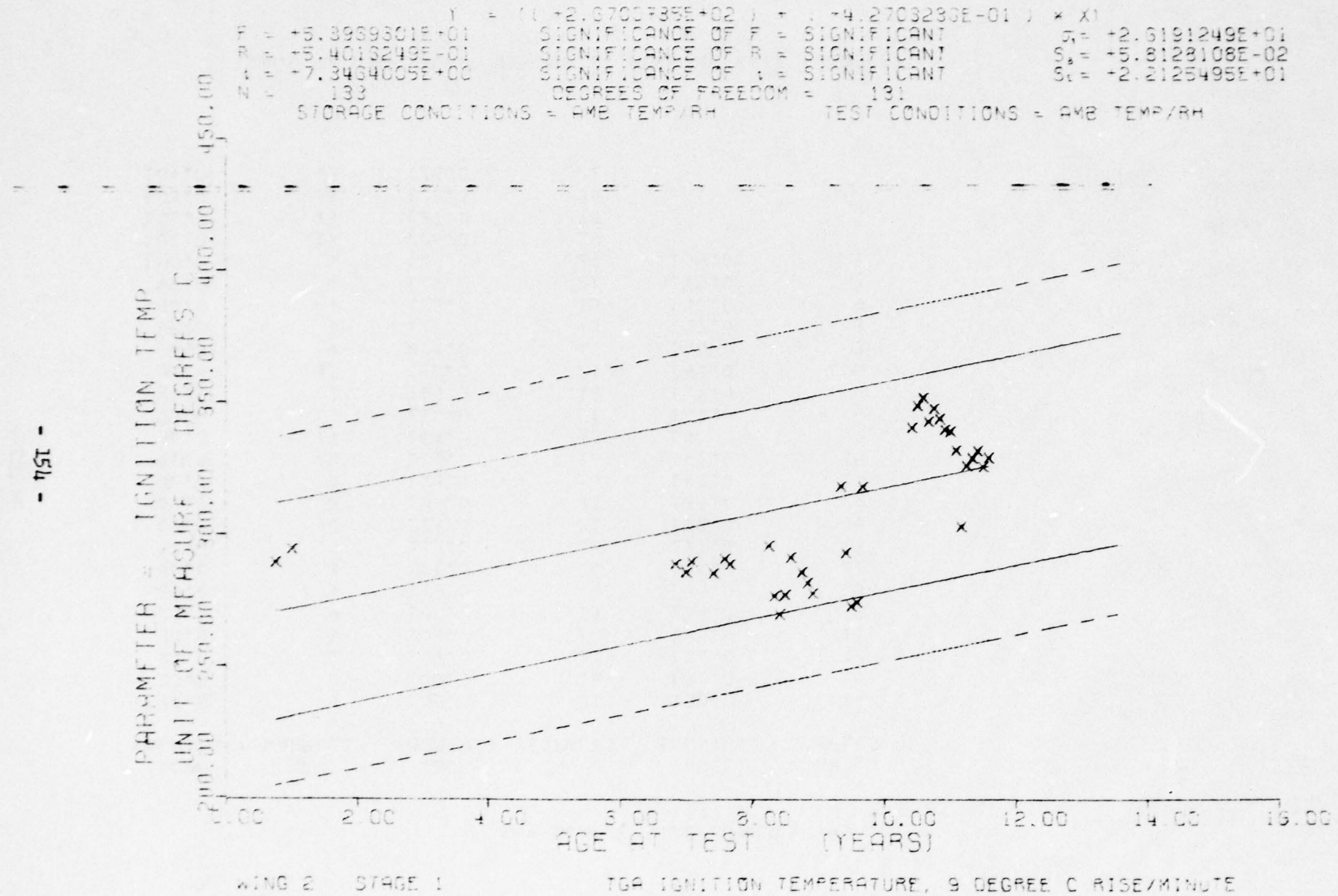

Y = (+2.9702735E+02) + (+4.2703230E-01) * X1
F = +5.3939301E+01
SIGNIFICANCE OF F = SIGNIFICANT
R = +5.4013240E-01
SIGNIFICANCE OF R = SIGNIFICANT
t = +7.3434005E+00
SIGNIFICANCE OF t = SIGNIFICANT
N = 133
DEGREES OF FREEDOM = 131
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = IGNITION TEMP
UNIT OF MEASURE = DEGREES C
200.00
250.00
300.00
350.00
400.00
450.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 2 STAGE 1
TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

Figure 58

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	6	129.0	5
12.0	4	130.0	8
82.0	1	131.0	6
84.0	1	132.0	5
85.0	1	133.0	4
89.0	2	134.0	6
91.0	1	135.0	8
92.0	1	136.0	11
99.0	1	137.0	8
100.0	2	138.0	2
101.0	1	139.0	5
102.0	3		
103.0	3		
105.0	3		
106.0	1		
107.0	3		
112.0	2		
113.0	3		
114.0	6		
115.0	3		
116.0	3		
125.0	3		
126.0	1		
127.0	1		
128.0	9		

WING 2 STAGE 1 TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

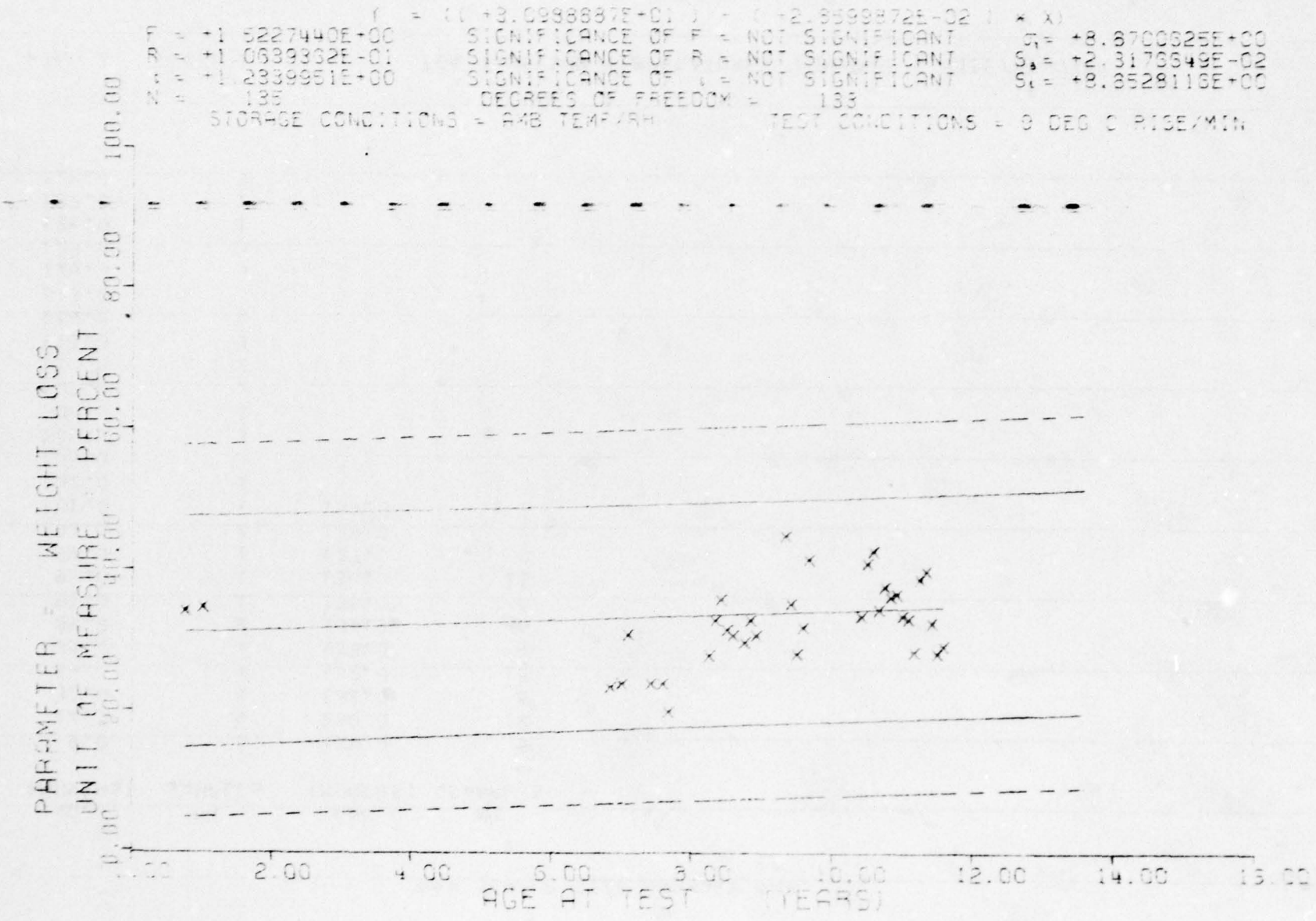
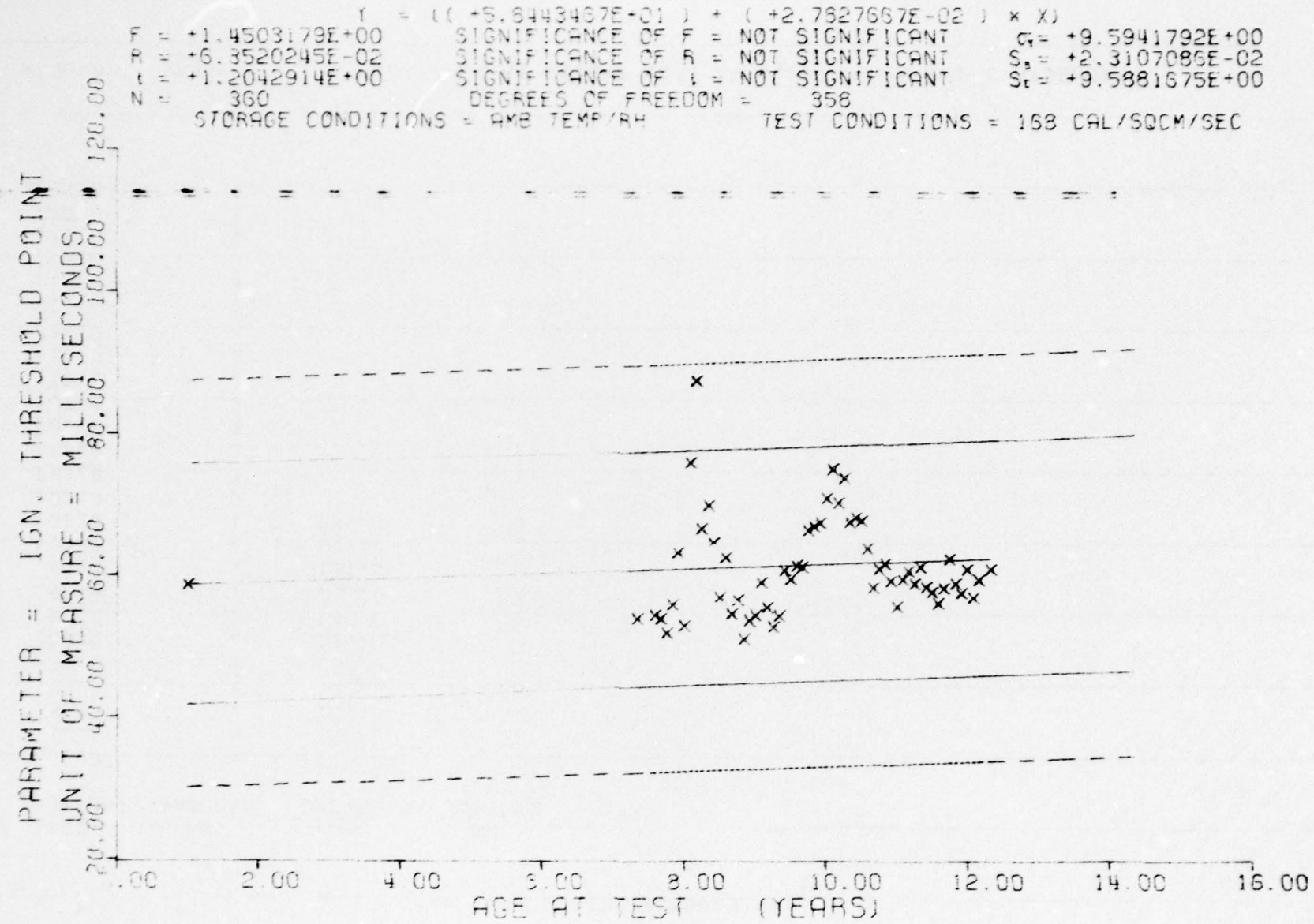

Y = (+3.0988887E+01) + (+2.3599872E-02 * X)
F = +1.5227440E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT S_1 = +8.8700325E+00
R = +1.0639332E-01 SIGNIFICANCE OF R = NOT SIGNIFICANT S_b = +2.3173649E-02
t = +1.2339951E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT S_t = +8.3528116E+00
N = 135 DEGREES OF FREEDOM = 133
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 9 DEG C RISE/MIN
PARAMETER = WEIGHT LOSS
UNIT OF MEASURE = PERCENT
0.00
20.00
40.00
60.00
80.00
100.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
AGE AT TEST (YEARS)
MIL-C 2 STAGE 1 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

Figure 59

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
9.0	6	129.0	5
12.0	4	130.0	8
82.0	1	131.0	6
84.0	1	132.0	5
85.0	1	133.0	4
89.0	2	134.0	3
91.0	1	135.0	10
92.0	1	136.0	14
99.0	1	137.0	3
100.0	2	138.0	2
101.0	1	139.0	5
102.0	3		
103.0	3		
105.0	3		
106.0	1		
107.0	3		
112.0	2		
113.0	3		
114.0	6		
115.0	3		
116.0	3		
125.0	3		
126.0	1		
127.0	1		
128.0	9		

WING 2 STAGE 1 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN



STAGE 1 WING 1&2 TF-H1011 IGNITABILITY. IGN THRESHOLD POINT, 168 CAL/SQ CM/SEC

Figure 60

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
12.0	10	114.0	12	139.0	5
88.0	1	115.0	6	140.0	3
91.0	2	116.0	10	141.0	2
92.0	4	117.0	6	142.0	5
93.0	1	118.0	6	143.0	6
94.0	3	119.0	11	144.0	1
95.0	3	120.0	6	145.0	1
96.0	3	121.0	8	146.0	2
97.0	4	122.0	8	148.0	2
98.0	4	123.0	9		
99.0	10	124.0	5		
100.0	7	125.0	11		
101.0	10	126.0	7		
102.0	8	127.0	10		
103.0	9	128.0	8		
104.0	9	129.0	1		
105.0	6	130.0	6		
106.0	10	131.0	5		
107.0	7	132.0	4		
108.0	12	133.0	8		
109.0	6	134.0	11		
110.0	8	135.0	1		
111.0	8	136.0	3		
112.0	12	137.0	2		
113.0	7	138.0	5		

STAGE 1 WING 1&2 TP-H1011 IGNITABILITY, IGN THRESHOLD POINT, 168 CAL/SQ CM/SEC

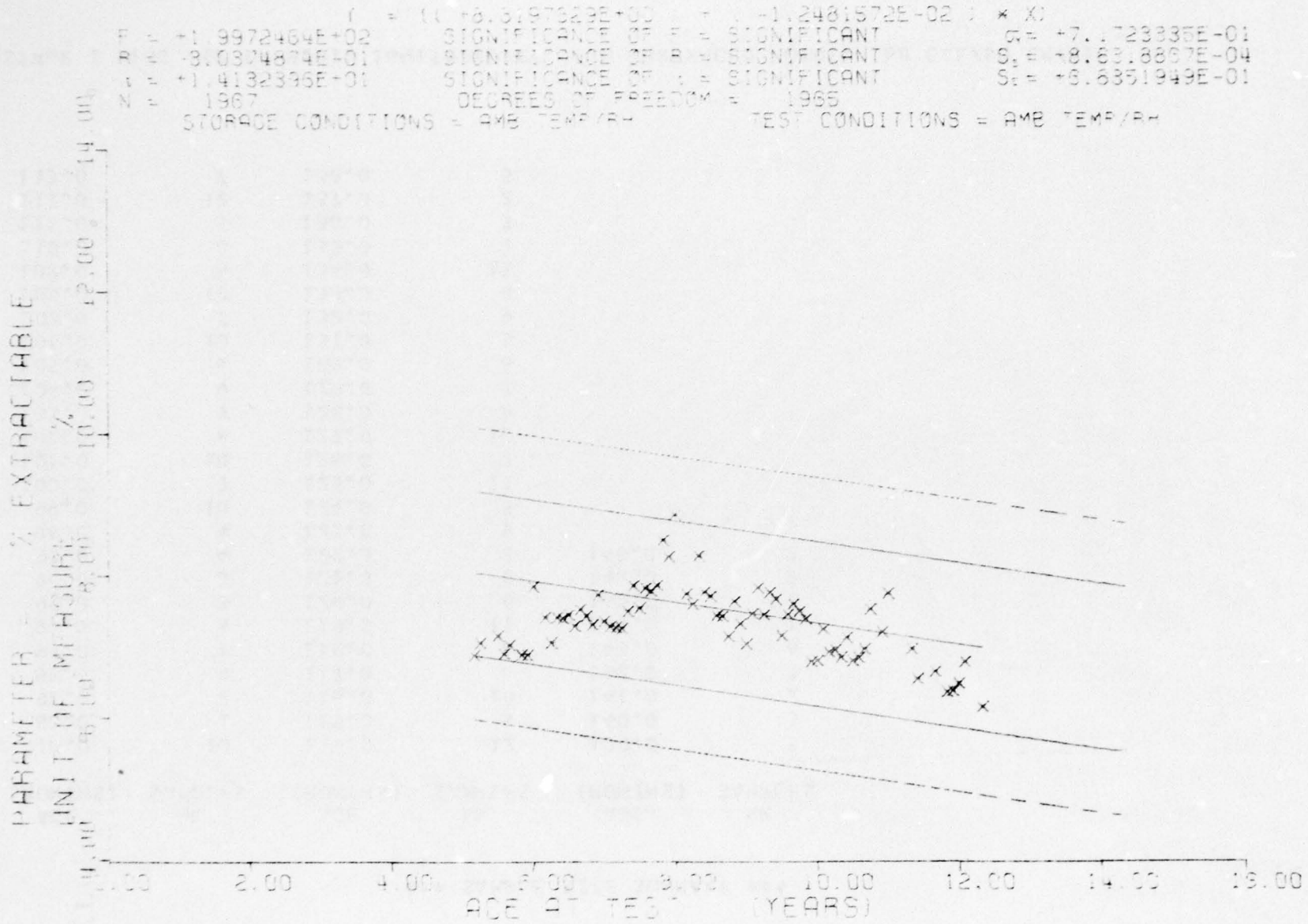
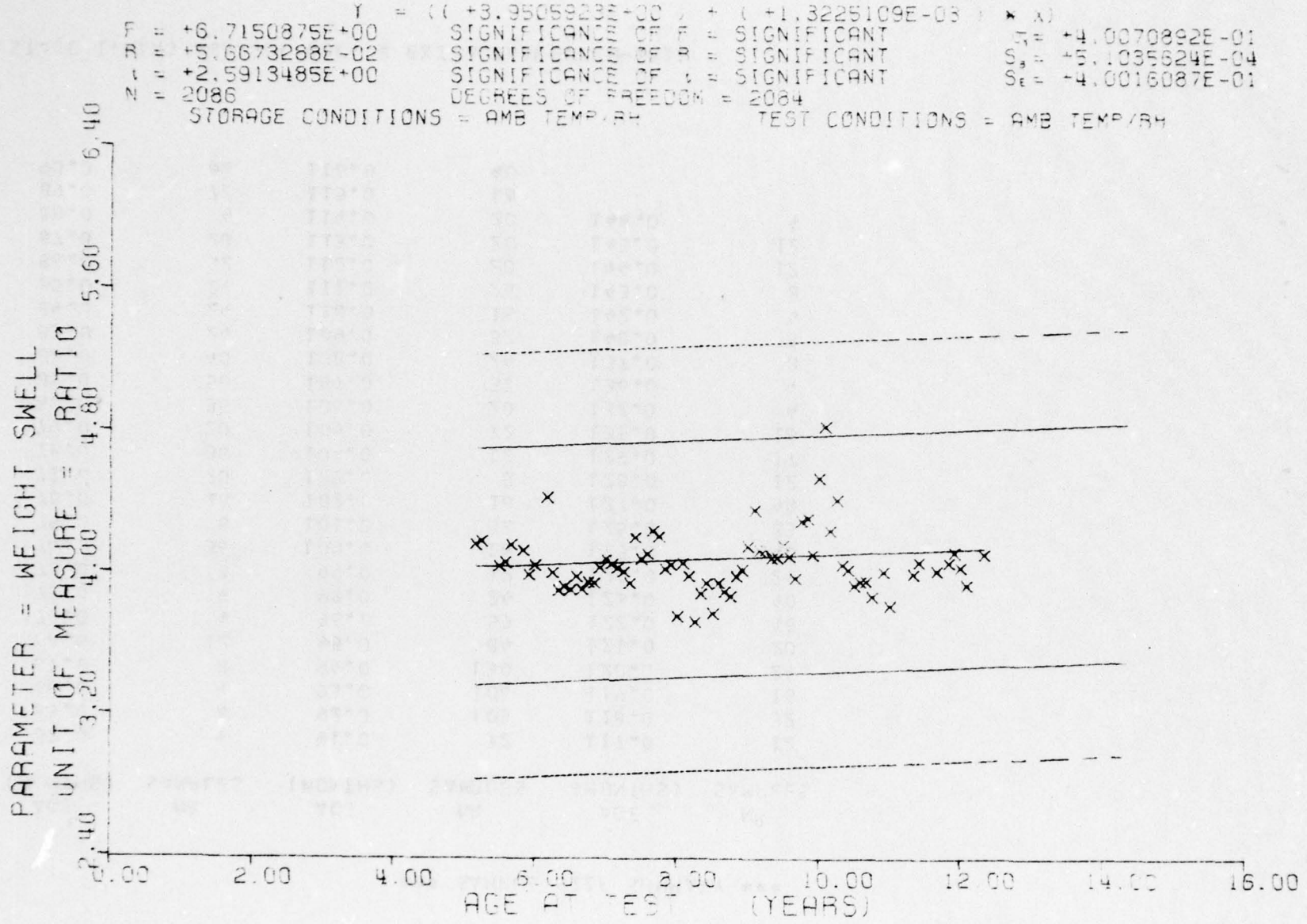

Y = ((+0.6197623E+00) T) -1.2401572E-02) * X)
F = +1.9972464E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = -8.0374874E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +1.4132396E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 1967 DEGREES OF FREEDOM = 1965
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER - % EXTRACTABLE
UNIT OF MEASURE - %
10.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE 1,WING A&B,SOL GEL, % EXTRACTABLE,TRH-1011

Figure 61

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	N^R SAMPLES
62.0	4	91.0	72	117.0	12
63.0	8	92.0	103	118.0	32
66.0	4	93.0	108	119.0	16
67.0	8	94.0	130	120.0	24
68.0	12	95.0	84	121.0	20
70.0	4	96.0	59	122.0	48
71.0	4	98.0	24	123.0	40
72.0	3	99.0	12	124.0	28
74.0	36	100.0	16	125.0	40
75.0	8	101.0	32	126.0	23
76.0	16	102.0	16	127.0	40
77.0	20	103.0	8	128.0	12
78.0	36	104.0	12	129.0	17
79.0	20	105.0	12	131.0	16
80.0	36	106.0	20	132.0	4
81.0	56	107.0	32	136.0	4
82.0	40	108.0	24	137.0	8
83.0	24	109.0	32	140.0	8
84.0	24	110.0	16	142.0	4
85.0	24	111.0	24	143.0	8
86.0	32	112.0	20	144.0	12
87.0	20	113.0	20	145.0	12
88.0	4	114.0	20	148.0	4
89.0	72	115.0	16		
90.0	68	116.0	40		

STAGE 1,WING A&B,SOL GEL, % EXTRACTABLE,TPH-1011



STAGE 1, WINC A&B, TP-H1011, SOL GEL, WT. SWELL RATIO

Figure 62

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
62.0	4	91.0	72	116.0	48
63.0	3	92.0	103	117.0	12
66.0	4	93.0	108	118.0	32
67.0	3	94.0	130	119.0	16
68.0	12	95.0	84	120.0	24
70.0	4	96.0	59	121.0	20
71.0	*	97.0	20	122.0	48
72.0	3	98.0	24	123.0	40
74.0	36	99.0	12	124.0	28
75.0	3	100.0	16	125.0	40
76.0	15	101.0	32	126.0	23
77.0	20	102.0	16	127.0	40
78.0	36	103.0	8	128.0	12
79.0	20	104.0	12	129.0	17
80.0	36	105.0	12	131.0	16
81.0	56	106.0	20	132.0	4
82.0	40	107.0	32	136.0	4
83.0	24	108.0	24	137.0	8
84.0	24	109.0	36	140.0	3
85.0	24	110.0	28	142.0	4
86.0	32	111.0	40	143.0	8
87.0	20	112.0	32	144.0	12
88.0	4	113.0	35	145.0	12
89.0	72	114.0	40	148.0	4
90.0	68	115.0	28		

STAGE 1, WING A&B, TP-H1011, SOL GEL, WT. SWELL RATIO

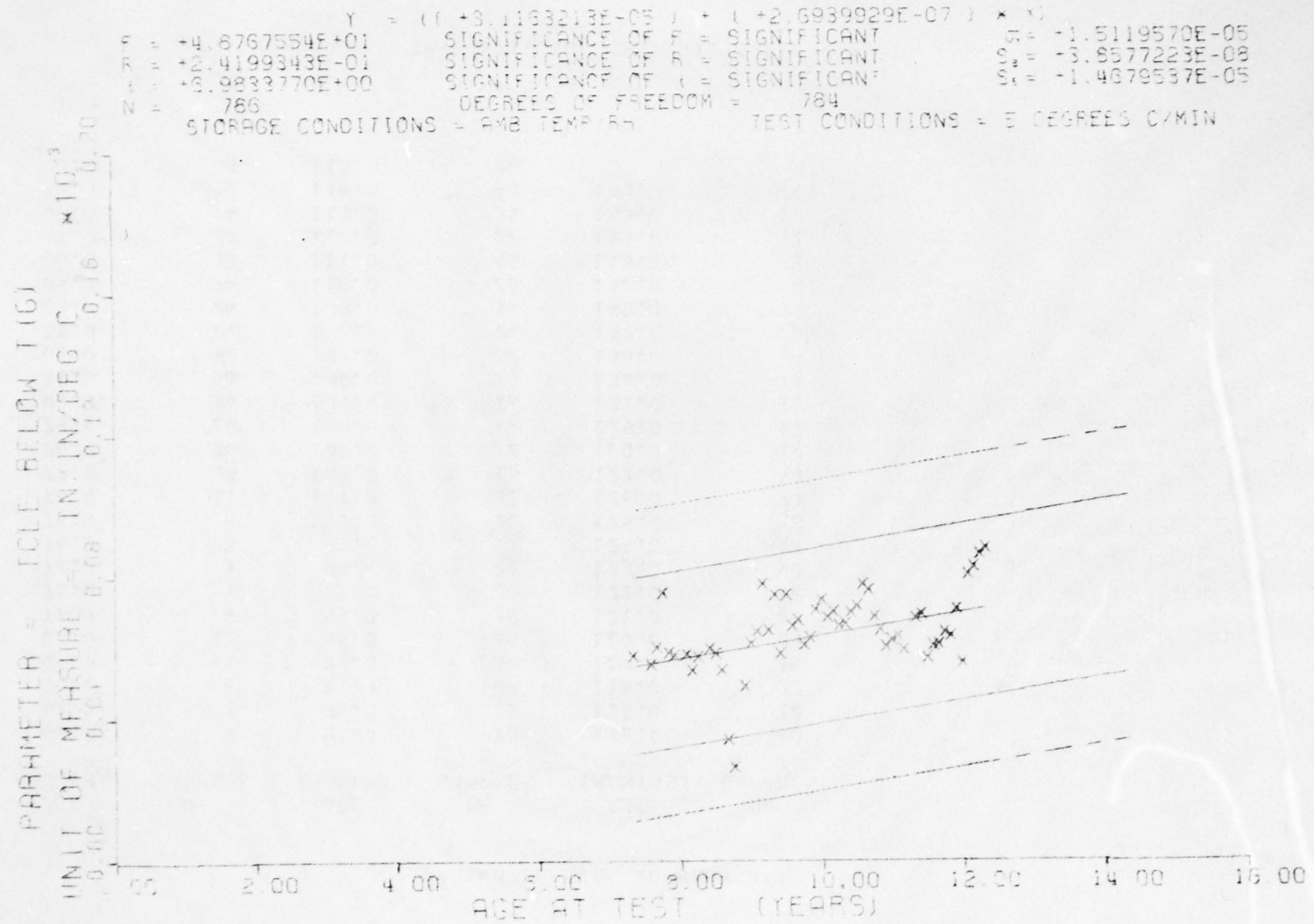

Y = (+3.1133213E-05) + (+2.6939929E-07) * X)
F = +4.8767554E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +2.4199343E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +6.9833770E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 786 DEGREES OF FREEDOM = 784
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 5 DEGREES C/MIN
σ = +1.5119570E-05
S_a = +3.8577223E-08
S_t = +1.4679537E-05
PARAMETER = ICLE BELOW TG)
UNIT OF MEASURE = IN./IN./DEG C x10⁻⁶
0.00 0.04 0.08 0.12 0.16 0.20
2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00
AGE AT TEST (YEARS)
WING 1&2 STAGE 1 TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TG

Figure 63

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES
[illegible]	[illegible]	117.0	19	143.0	24
[illegible]	[illegible]	118.0	24	144.0	3
[illegible]	[illegible]	119.0	43	145.0	3
[illegible]	[illegible]	120.0	29	146.0	3
[illegible]	[illegible]	121.0	20	147.0	3
[illegible]	[illegible]	122.0	15	148.0	3
[illegible]	[illegible]	123.0	23		
[illegible]	[illegible]	124.0	16		
[illegible]	[illegible]	125.0	9		
[illegible]	[illegible]	126.0	21		
[illegible]	[illegible]	127.0	16		
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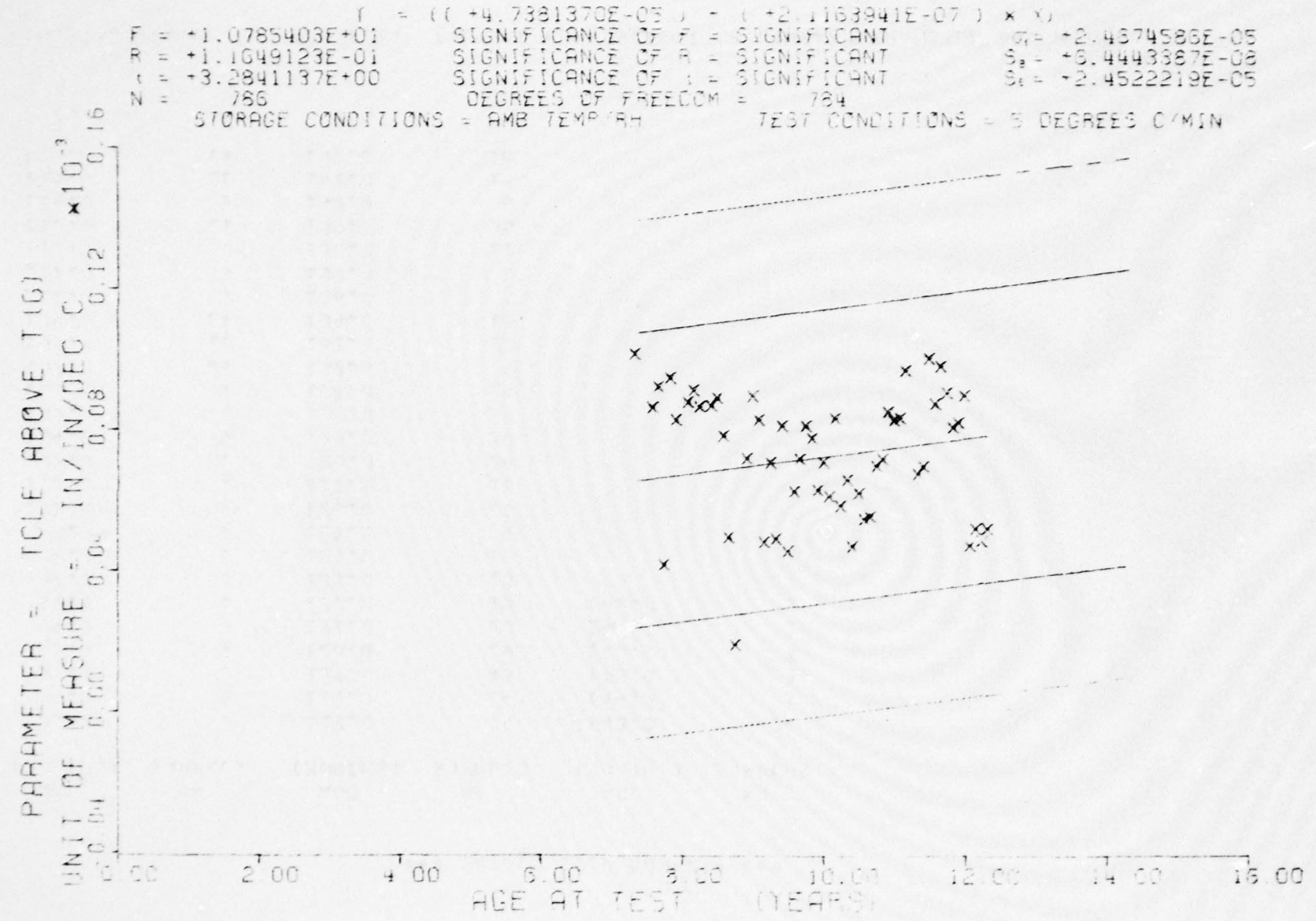
[illegible] 182 STAGE 1 TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION, BELOW TG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R = +1.1649123E-01 SIGNIFICANCE OF R = SIGNIFICANT S2 = +6.4443887E-08
t = +3.2841137E+00 SIGNIFICANCE OF t = SIGNIFICANT St = +2.4522219E-05
N = 786 DEGREES OF FREEDOM = 784
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 5 DEGREES C/MIN
PARAMETER = TCLE ABOVE T(G)
UNIT OF MEASURE = IN/IN/DEG C x10-3
0.00 0.04 0.08 0.12 0.16
0.00 2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00
AGE AT TEST (YEARS)
WING 142 STAGE I TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

Figure 64

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
88.0	5	117.0	19	143.0	24
91.0	3	118.0	24	144.0	3
92.0	6	119.0	43	145.0	3
93.0	7	120.0	29	146.0	3
94.0	5	121.0	20	147.0	3
95.0	3	122.0	15	148.0	3
97.0	5	123.0	13		
98.0	3	124.0	18		
99.0	7	125.0	9		
101.0	7	126.0	21		
102.0	5	127.0	18		
103.0	21	128.0	24		
104.0	5	129.0	30		
105.0	5	130.0	30		
106.0	7	131.0	24		
107.0	24	132.0	9		
108.0	12	133.0	12		
109.0	24	134.0	15		
110.0	5	136.0	6		
111.0	7	137.0	6		
112.0	5	138.0	21		
113.0	24	139.0	35		
114.0	7	140.0	6		
115.0	21	141.0	15		
116.0	18	142.0	18		

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13. ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30A and B First Stage Minuteman Motors. This report is the ninth time that a statistical approach has been used to analyze First Stage bulk carton propellant. Testing was accomplished in accordance with MMEMP Project M62413M 4MP068P.

The purpose of testing was to determine and provide early warning of any serious degradation trends occuring in the propellant for service life predictions.

An analysis of all parameters indicate that no potential problems are expected in the propellant for at least two years past the oldest data point.

Data stored in the G085 System were plotted utilizing the IBM 360-65 Computer and CAL-COMP Plotter. The data range at any age can be found by suitable inquiry of the G085 System.

Each point on the regression plot represents the mean of all samples at that particular age. The number of specimens at each point is indicated on the sample size summary sheet on the page accompanying each regression plot.

KEY WORDS: Solid Propellant
Minuteman

DD FORM 1 NOV 65 1473

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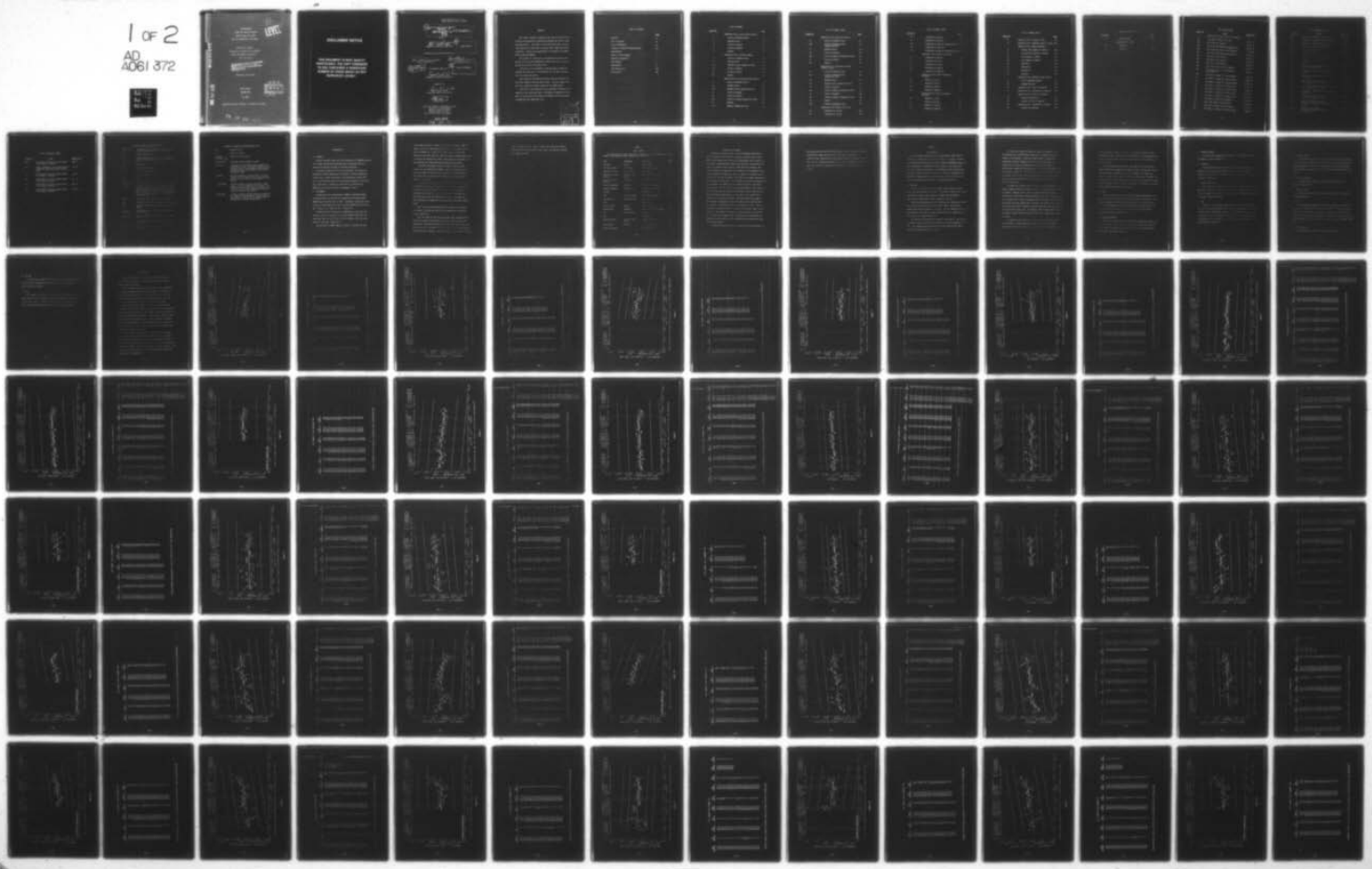
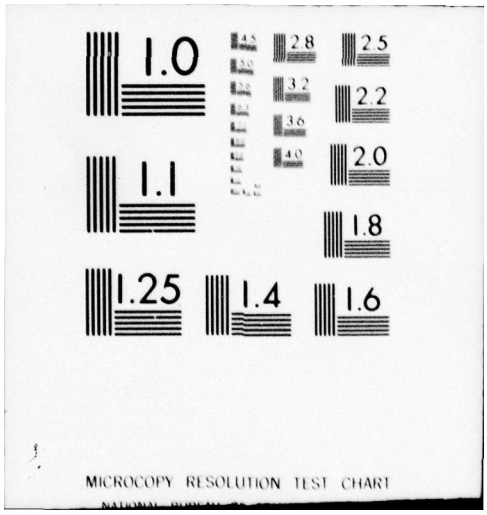
PROPELLANT SURVEILLANCE REPORT. LGM-30 A AND B STAGE I, TP-H101--ETC(U)
SEP 75 J A THOMPSON

UNCLASSIFIED MANCP-328(75) NL

1 OF 2
AD
A061 372

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2.5
2.8
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3.6
4.0
MICROCOPY RESOLUTION TEST CHART

(1)

LEVEL II

HEADQUARTERS

OGDEN AIR LOGISTICS CENTER

UNITED STATES AIR FORCE

HILL AIR FORCE BASE, UTAH 84406

PROPELLANT SURVEILLANCE REPORT LGM-30A&B STAGE 1 TP-H1011

PROPELLANT LAB SECTION

MANCP REPORT

NR 328 (75)

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MANCP REPORT NR 328 (75)
MMEMP PROJECT M62413M 4MP068P

(6) PROPELLANT SURVEILLANCE REPORT TP-H1011 LGM-30 A & B STAGE I and TP-H1012

Author

John A. Thompson (14) MANCP-328(75)

JOHN A. THOMPSON, Chemist
Component & Combustion Test Unit

Engineering & Statistical Review By

John K. Scambia
JOHN K. SCAMBIA, Project Engineer
Service Engineering

Edward J. Erickson
EDWARD J. ERICKSON, Statistician
Data Analysis Unit

(12) 183 p.

Recommended Approval By

(10) John A. Thompson

Leonidas A. Brown
LEONIDAS A. BROWN, Chief
Component & Combustion Test Unit

Approved By

Don F. Woods
DON F. WOODS, Chief
Propellant Laboratory Section

(11) Sep 75

Industrial Products & Ldg Gear Division
Directorate of Maintenance
Ogden Air Logistics Center
United States Air Force
Hill Air Force Base, Utah 84406

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29A	Test Report (Missile in silo)	13 Jan 64
29B	Zero Time Test Results	29 Jan 64
29C	Zero Time Test Results (Supplement 1)	30 Mar 64
29D	Zero Time Test Results (Aft Closure)	9 Jun 64
29E	Zero Time (Aft Closure Supplement 1)	24 Jun 64
29F	ATP Phase I Test Results	30 Mar 65
29G	ATP Phase I Test Results	19 Aug 65
29H	ATP Phase I Test Results	10 Sep 65
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61	ATP Phase I, Wings II-V (Fifth Group)	10 Jun 66
66	ATP Phase I, Wings II-V (Sixth Group)	22 Jul 66
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78	Zero Time, Wing VI Test Results	3 Feb 67
104	ATP Phase I, Wing VI (First Group)	12 Oct 67
118	ATP Phase II, Wings II-V (First Group)	5 Mar 68

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126	ATP Phase II, Wings II-V (Second Group)	11 Apr 68
130	ATP Phase II, Wings II-V (Third Group)	3 May 68
162	ATP Phase I, Wing VI (Second Group)	30 Sep 69
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288	Propellant Surveillance Report LGM-30A & B, Stage 1, TP-H1043	Mar 74
290	Propellant Surveillance Report LGM-30F & G, Stage 1, Phase B, Series I, TP-H1011	Mar 74
300	Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	May 74

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302	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Nov 74
313	Stage 1 Propellant Surveillance Report, Propellant Containing Glacial Acrylic Acid	Oct 74
315	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Jan 75
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325	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	June 75

GLOSSARY OF TERMS AND ABBREVIATIONS

Aging Trend	A change in properties or performance resulting from aging of material or component
CSA	Cross Sectional Area
E	Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve
EB	End Bonded
ECL	Effective Gage Length
em	Strain at maximum stress
er	Strain at rupture
DB	Dogbone
Degradation	Gradual deterioration of properties or performance
"F" ratio	The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points.
JANNAF	Joint Army, Navy, NASA, Air Force Committee
MANCP	Propellant Lab Section at Ogden Air Logistics Center
OOALC	Ogden Air Logistics Center, Air Force Logistics Command
Regression Equation	The general form of the regression equation is $Y = a + bx$
Regression Line	Line representing mean test values with respect to time
S_b	Standard error of estimate of the regression coefficient
S_e or $S_{Y,X}$	Standard Deviation of the data about the regression line

GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

Sm	Maximum Stress
Sr	Stress at rupture
Standard Deviation (S_Y)	Square root of variance
Strain Rate	Crosshead speed divided by the EGL
"t" test	A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level)
Variance	The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results
3 Sigma Band	The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.
90-90 Band	It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.

INTRODUCTION

A. PURPOSE:

Quality assurance tests have been conducted for thirteen years on First Stage LGM-30A and B Minuteman Motor Propellant blocks to evaluate the effects of aging on TP-H1011 propellant.

Statistical analysis of the tests performed, as directed by Engineering, should provide early warning if serious degradation trends occur. Annual evaluation of the propellant provide data that can be directly input into engineering reliability and service life predictions. Testing was performed in accordance with MMEMP Directive GTD-1C and GTD-1C Amendments 1 and 2.

B. BACKGROUND:

Testing was first accomplished at MANCP on LGM-3CA TP-H1011 propellant blocks in 1963 and was designated Zero-Time Testing (MAGCP Report Nrs 29B, 29C and 29F). Subsequent testing was accomplished at approximately 24 month intervals (MAGCP Report Nrs 29G, 29H - Phase I; 76 - Phase II; 181 - Phase III).

LGM-30B Zero-Time testing was accomplished in 1964 with subsequent testing at intervals of 24 months (MAGCP Report Nrs 32A - Zero-Time; 32C, 49, 53, 55, 58, 61, 66 - Phase I; 118, 126, 130 - Phase II; 195, 268 - Phase III).

Reports prior to MAGCP Report Nr 223(72) contained raw data

using sigma relation to compare to Zero-Time variance. MANCP Report Nr 259 (72) published in April of 1972 contained all the data on LGM-30A, B, F and G in the G085 System at that time. Report Nrs 258 (72), 268 (73), 280 (73) reported LGM-30A and B data in statistical analysis by itself. This report is the fifth time that LGM-30A and B data have been reported in this manner.

Zero-Time testing was started as soon as possible after receipt of the propellant by MANCP. Data from these tests were used to establish a base line for each test to which subsequent test data (ATP - Accelerated Test Plan) were compared in the reports listed above.

The LGM-30A and B propellant test matrix (Table 1) was used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens were subjected. Low rate tensile and hardness specimens were taken from all LGM-30A and B blocks. Specimens for other physical and combustion tests were taken from every seventh block.

Some tests were not conducted at the earlier test periods (0-6 years) and therefore data are not available for inclusion in the regressions.

Post cure data for the first few years after casting usually shows more change in data results. To see how this affects the regressions, analyses were performed on data starting at six years after zero time to determine if the regression curves were significantly different. Separate regressions were run on all but the very

low rate tensile tests. Where a significant change was evident, the regressions are included in this report and labeled "included for comparison only".

Table 1

Test Program

The test matrix is taken from GTD-1C, Amendment 2, and the tests, conditions, number of specimens and test methods are listed below.

Test	Conditions	Description	Per Cond
Hardness	10 Sec	Dogbone Ends	3
Low Rate Tensile	2.0 in/min	1/2" JANNAF Dogbone	3
High Rate Tensile	1750 in/min	3/4" Dogbone	3
High Rate Triaxial Tensile	600 psi, 1750 in/min	3/4" GL Rail End bonded	1
Low Rate Biaxial Tensile	0.2 in/min	3/4" GL Rail End Bond	1
Stress Relaxation	3% & 5%	1/2" x 1/2" x 4" EB	3
Dynamic Response	70 gm ct wt	3.3" dia x .33" disc	1
Sol Gel		1/2" x 1/2"	8
VLR	2×10^{-3} in/min	1/2" JANNAF Dogbone	3
Ignitability	168 cal/cm^2 sec	.050" wafer	3
TCLE		.200" wafer	3
Pressure Time	500 psi	1/2" x 3/8" x 1"	3
Burning Rate	1000 psi	.156" x .156" x 5" Strand	3
DTA	12°C Rise/min	.040" wafer	3
DSC		.040" wafer	3
Poisson's Ratio	77°F $\pm$ 2° 15% Strain	.50" x .50" x 4"	6
Tear Energy	70°F $\pm$ 2°	0.1" x 1.18" x 3"	6
Failure Envelope		JANNAF Dogbone	3

STATISTICAL APPROACH

The linear regression model is used throughout this report. Where data trends and variances appeared to deviate from a linear model, other models were tried but no improvement over a linear fit was found. Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The "t" values and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. Data were plotted by computer. The "y" axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying each regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

In addition, after analyzing the regressions which included the

data generated over the total time period, some of the tests indicated considerable change during the first few years of testing. A seperate linear regression was calculated starting at six years after zero time for comparison purposes only. Where a significant difference was observed, the comparison only data were included in this report.

TEST RESULTS

From the general appearance of the regressions, more variation in data were evident over the first few years of testing. In order to determine how the data were affected, Service Engineering requested that an analysis be performed on data starting at six years after zero time testing to determine if the regressions were significantly different. Where a significant change was evident, regressions were included for comparison only. This was done to see if a post cure effect was significantly affecting the regression curves.

A. TENSILE:

Very low rate tensile testing started approximately six years after the test program was initiated. The strains show a statistically significant decrease, the stresses no change, and the modulus a statistically significant increase (Figures 1 thru 5).

The low rate regressions show a statistically significant decrease for strains while the stresses and modulus show a statistically significant increase (Figures 6 thru 10). For the comparison regression, only maximum stress shows a change which went from a significant to a non-significant change (Figure 7A).

The biaxial testing shows no change in the strains. The stresses and modulus show a statistically significant increase (Figures 11 thru 15). The comparison only regressions for this time period shows no significant change (Figure 14A & 15A).

For high rate tensile testing, the strain at maximum stress and modulus show a statistically significant increase, however, the change is very gradual. Strain at rupture shows a statistically significant decrease (Figures 16 thru 20). The comparison only regression for strain at maximum stress (Figure 16A) shows a statistically significant increase with the slope being steeper than that shown in Figure 16. The comparison only regression for strain at rupture shows a statistically significant decrease (Figure 18A) which is noticably greater than for the regression showing all of the data (Figure 18).

For high rate triaxial tensile testing, strain at maximum stress shows a gradual statistical increase with the strain at rupture showing a decrease. Maximum stress, stress at rupture and modulus show a statistically significant increase (Figures 21 thru 25). The comparison only regression for strain at maximum stress also shows a statistically significant increase (Figure 21A). However, the slope of the comparison only regression curve is greater than the regression curve which covers all of the data (Figure 21). For maximum stress (Figure 22A) stress at rupture (Figure 24A) and modulus (Figure 25A), significant changes are shown.

It should be noted that the strain at maximum stress for high rate testing is increasing gradually while the strain at maximum stress for low rate testing is decreasing slowly. This appears to be

anomalous behavior except that these same trends are seen in other propellants tested. However, from the analysis of the propellant data, it does not appear that significant degradation will occur within the next two years.

For the overall tensile tests, the slope of the curves show a gradual change or no change with respect to age. The low rate tensile regressions show a gradual decrease or no change for strains and a gradual increase or no change for stresses and modules. The high rate testing does not follow this pattern for strain at maximum stress which shows a gradual increase. However, the slope of the curves are gradual, and no operational problems are expected.

B. CREEP:

The test results show a statistically significant decrease for both the 10 and 12 pound load regressions (Figures 26 thru 35). These results correlate well with the strain results for tensile testing.

For the comparison only regressions, the 10 pound load at 500 and 1000 second regression show a change in trend which are not significant (Figures 20A and 30A).

C. STRESS RELAXATION:

Modulus at 3 and 5% show a statistically sigrificant increase at all time periods, 10, 50, 100 and 1,000 seconds (Figures 36 thru 43). In all cases, the slope of the regression curves are gradual and no operational problems are expected.

D. CONSTANT STRAIN:

A statistically significant increase is shown. This increase is gradual as seen in Figure 44.

E. HARDNESS:

The propellant shows a statistically significant increase in hardness. This increase is gradual and correlates well with the tensile tests which show a decrease in strain and increase in stress properties (Figure 45).

F. DYNAMIC RESPONSE:

The storage shear modulus at 200 and 400 Hz shows a statistically significant decrease. The decrease is gradual (Figures 46 and 47). The loss tangent shows statistically significant increase. This increase is gradual (Figures 48 and 49)

G. DTA:

There is a statistically significant decrease in the endotherm and first and second exotherms while the ignition temperature is showing a statistically significant increase. In all cases, the slope of the regressions curves are gradual which indicates that propellant combustion properties are changing very little and are not a problem at this time (Figures 50 thru 53).

H. PRESSURE TIME:

A statistically significant increase is shown in time to maximum pressure with the maximum pressure showing a statistically significant decrease (Figures 54 and 55). In both cases the slopes are gradual and no problems are expected for at least two years past the last data point.

I. HEAT OF EXPLOSION:

A statistically significant increase is shown for heat of explosion (Figure 56).

J. BURNING RATE:

The burning rate data shows a gradual statistically significant decrease (Figure 57).

K. TGA:

The TGA ignition temperature shows a statistically significant increase. It will be noted that the data after 10 years is noticeably higher than previous data. This may be caused by a change in instruments and will be further investigated to determine if this is instrument caused (Figure 58). The weight loss at ignition shows no change (Figure 59).

L. IGNITABILITY:

The ignitability data shows no change (Figure 60).

M. SOL GEL:

A statistically significant increase for weight swell ratio and a statistically significant decrease for percent extractables is shown (Figures 61 and 62).

N. TCLE:

The thermal coefficient of linear expansion below and above the glass transition point shows a statistically significant increase. However, this increase is gradual and no problems are expected for at least two years beyond the last data point (Figures 63 and 64).

CONCLUSIONS

This report includes all LGM-30A and B bulk propellant test results presently in the G085 System and covers the past thirteen years of testing.

The test results show that under present storage conditions the physical/mechanical and combustion properties of the propellant are remaining relatively unchanged with age. This is indicated by the regression plots where the slope of the trend line is relatively flat or close to a line of zero slope.

From the statistical analyses, it can be stated with 90% confidence that all tests conducted indicate that motor propellant reliability will be equal to or exceed 90% for two years past the last data point on the regression. Since failure limits are not available for the parameters tested, this statement is based on the fact that trends so far established have slopes relatively flat or close to a line of zero slope and have not changed appreciably from the last test period.

In most cases, the six year to latest data did not change the regression curves significantly. Where there were changes, they are shown in this report. Most of the changes went from a statistically significant increase or decrease to no statistically significant change. For LGM-30 A&B, there is sufficient data so that elimination of post cure data does not significantly affect the validity of the regressions.

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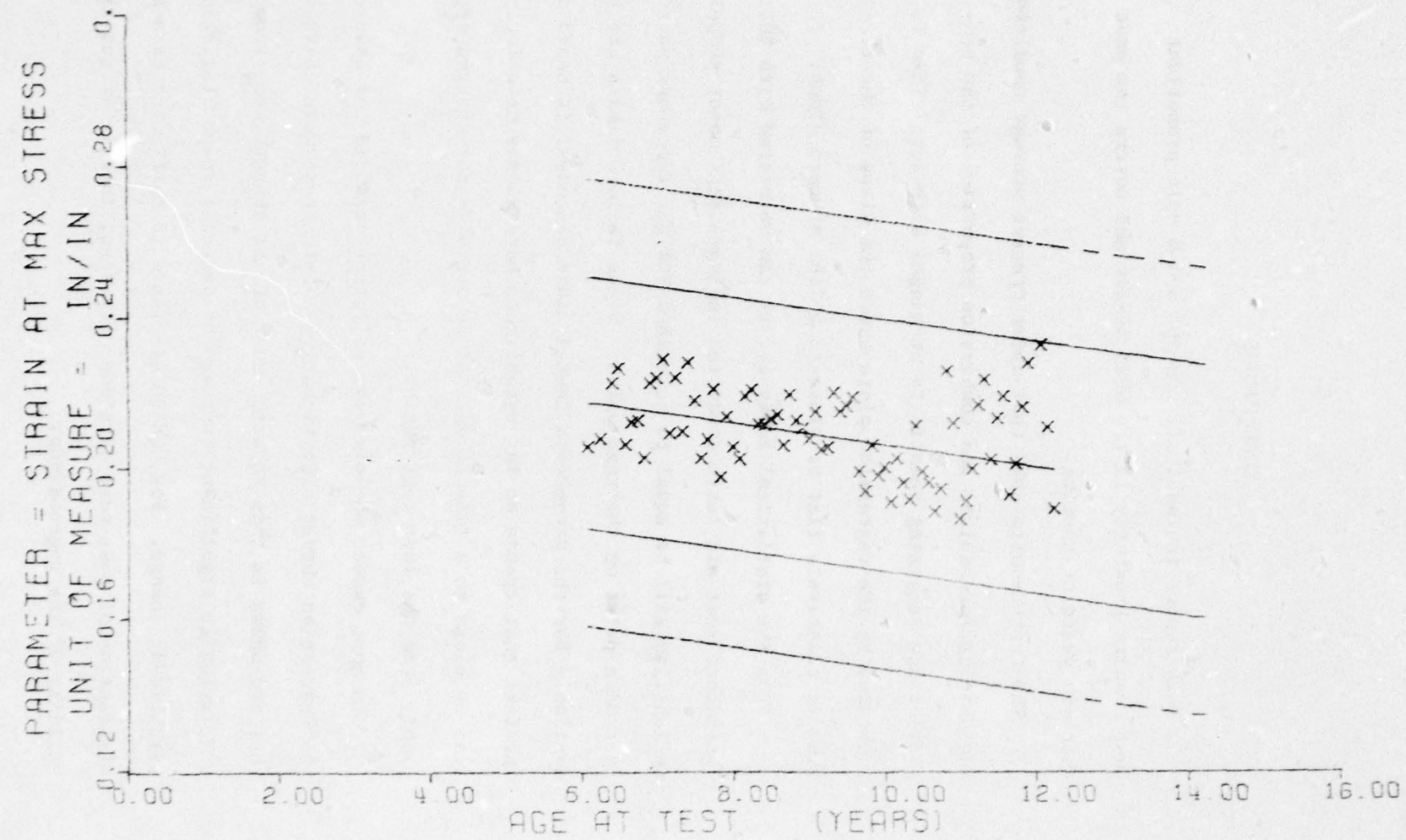
N = 1396 DEGREES OF FREEDOM = 1394

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



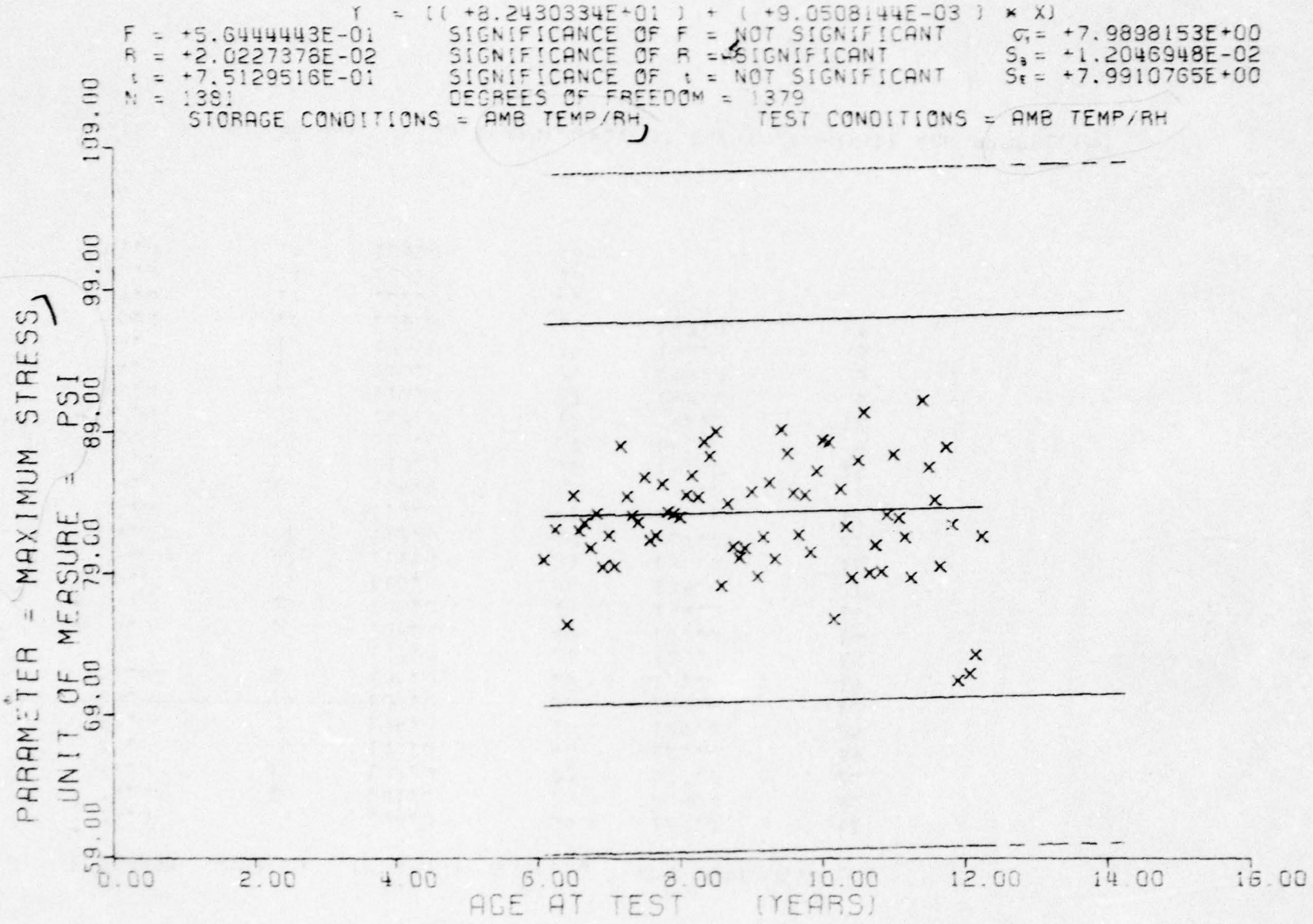
TENSILE STRAIN AT MAX STRESS (EM), CHS=0.002 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 1

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES
[illegible]	[illegible]	100.0	34	126.0	11
[illegible]	16	101.0	24	126.0	30
[illegible]	13	102.0	22	127.0	20
[illegible]	3	103.0	40	128.0	38
[illegible]	5	104.0	20	129.0	25
[illegible]	30	105.0	30	130.0	12
[illegible]	16	106.0	28	131.0	19
[illegible]	9	107.0	20	132.0	16
[illegible]	16	108.0	44	133.0	14
[illegible]	16	109.0	17	134.0	13
[illegible]	9	110.0	26	135.0	21
[illegible]	40	111.0	23	136.0	15
[illegible]	27	112.0	29	137.0	21
[illegible]	[illegible]	113.0	41	138.0	12
[illegible]	10	114.0	15	139.0	[illegible]
[illegible]	7	115.0	16	140.0	18
[illegible]	15	116.0	27	141.0	9
[illegible]	7	117.0	12	142.0	12
[illegible]	22	118.0	27	143.0	6
[illegible]	17	119.0	24	145.0	3
[illegible]	15	120.0	34	146.0	3
[illegible]	11	121.0	18	147.0	3
[illegible]	17	122.0	21		
[illegible]	23	123.0	12		
[illegible]	21	124.0	16		

[illegible] STRAIN AT MAX STRESS (EM) ,EMS=0.002 IN/MIN, TP-H1011 A&B PROPELLENT



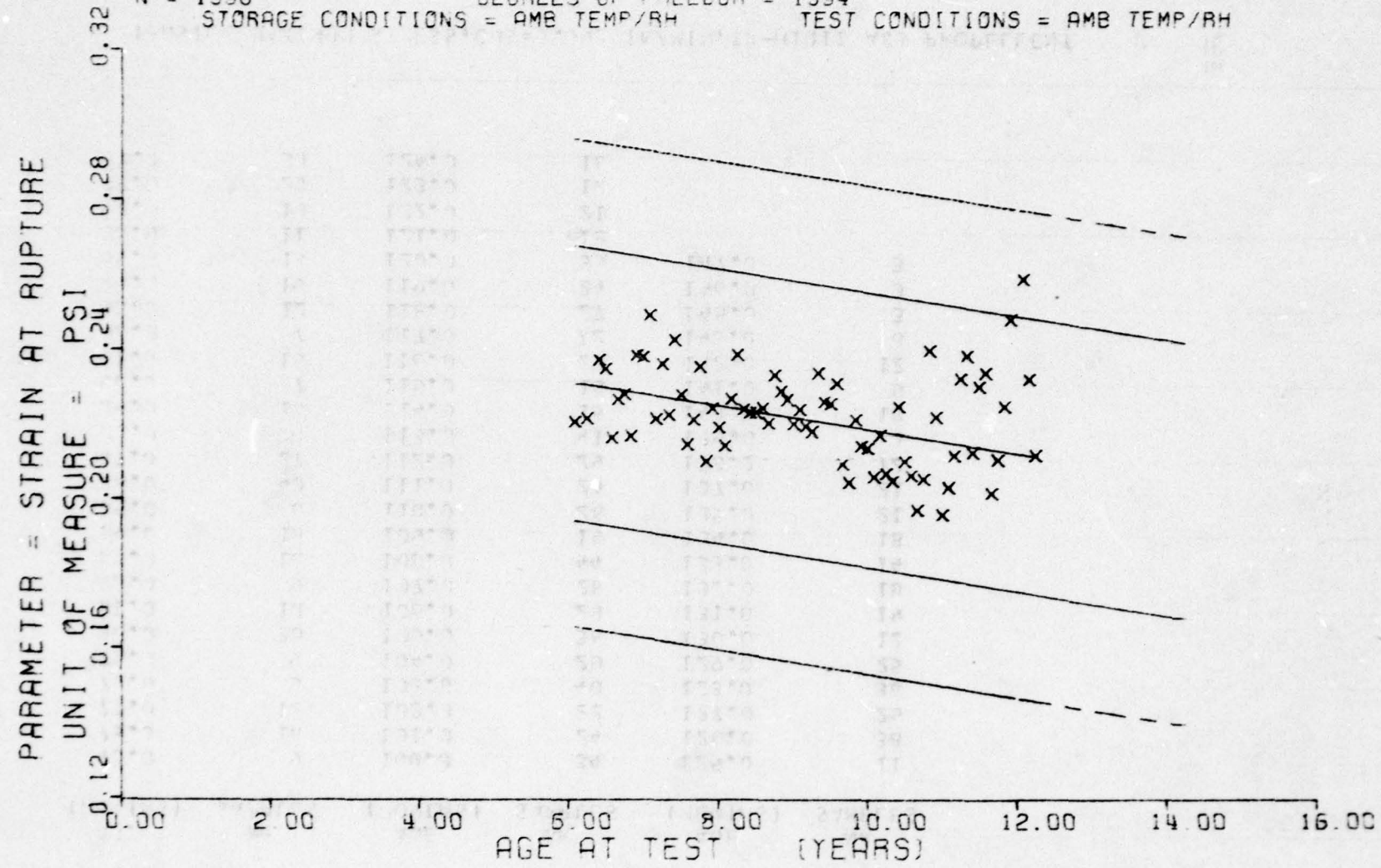
TENSILE MAXIMUM STRESS, CHS=0.002 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 2

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
76.0	9	100.0	34	125.0	11
78.0	16	101.0	24	126.0	38
77.0	18	102.0	22	127.0	26
78.0	5	103.0	40	128.0	38
79.0	9	104.0	20	129.0	25
80.0	30	105.0	36	130.0	12
81.0	18	106.0	28	131.0	19
82.0	9	107.0	29	132.0	18
83.0	16	108.0	44	133.0	14
84.0	18	109.0	19	134.0	18
85.0	6	110.0	28	135.0	21
86.0	40	111.0	24	137.0	21
87.0	27	112.0	29	138.0	12
88.0	23	113.0	41	139.0	5
89.0	16	114.0	15	140.0	18
90.0	7	115.0	16	141.0	9
91.0	15	116.0	27	142.0	12
92.0	7	117.0	12	143.0	6
93.0	12	118.0	27	145.0	3
94.0	19	119.0	24	146.0	3
95.0	13	120.0	33	147.0	3
96.0	11	121.0	18		
97.0	19	122.0	21		
98.0	23	123.0	12		
99.0	37	124.0	16		

TENSILE MAXIMUM STRESS,CHS=0.002 IN/MIN,TP-H1011 ABS PROPELLENT



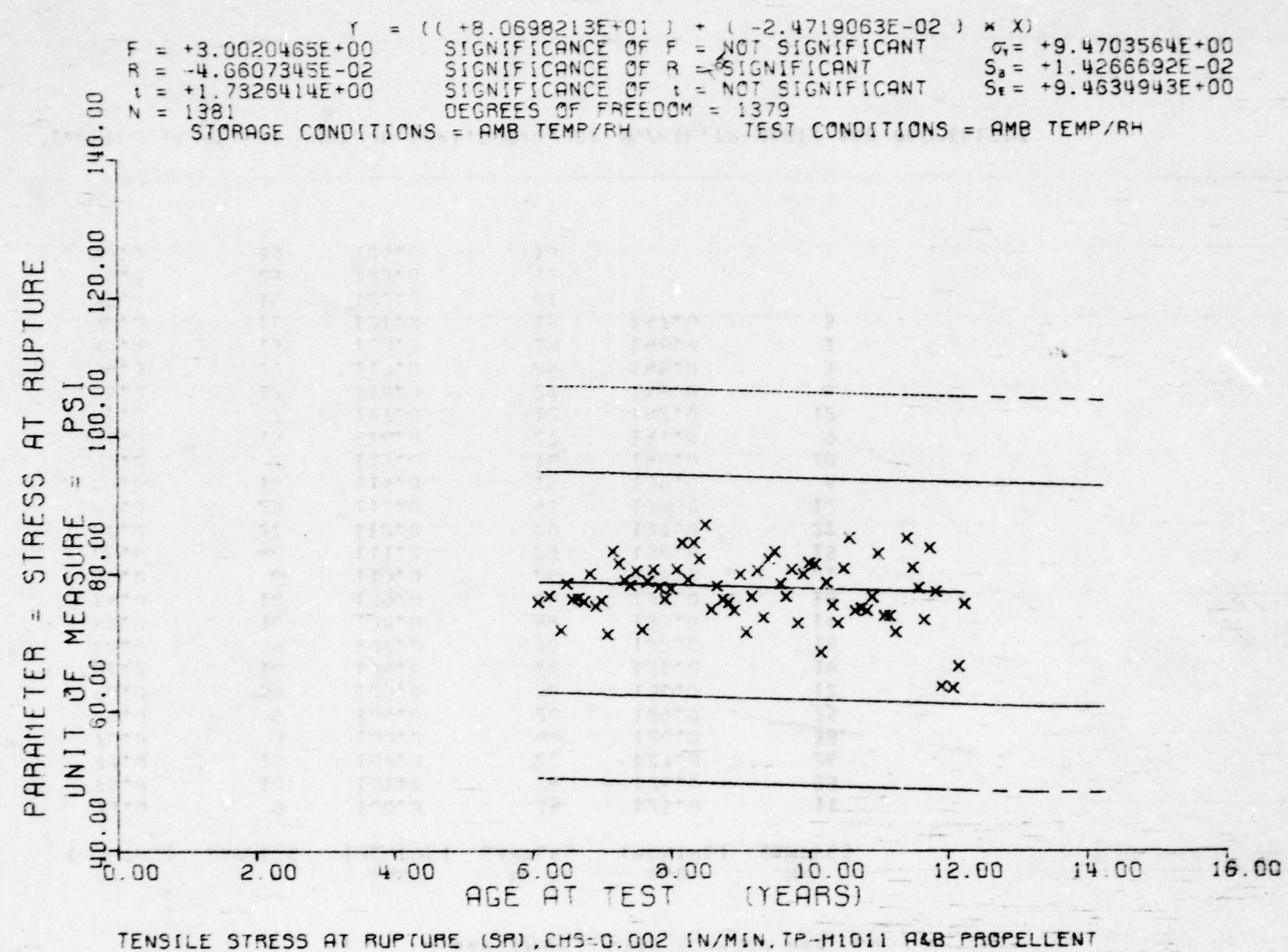
TENSILE STRAIN AT RUPTURE (ER), CHS=0.002 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 3

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	# SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
75.0	9	100.0	34	125.0	11
76.0	18	101.0	24	126.0	38
77.0	28	102.0	22	127.0	26
78.0	3	103.0	40	128.0	38
79.0	9	104.0	20	129.0	25
80.0	30	105.0	36	130.0	12
81.0	16	106.0	28	131.0	19
82.0	9	107.0	28	132.0	18
83.0	16	108.0	44	133.0	14
84.0	18	109.0	19	134.0	18
85.0	6	110.0	26	135.0	21
86.0	40	111.0	24	136.0	15
87.0	27	112.0	29	137.0	21
88.0	23	113.0	41	138.0	12
89.0	10	114.0	19	139.0	6
90.0	7	115.0	16	140.0	18
91.0	15	116.0	27	141.0	9
92.0	7	117.0	12	142.0	12
93.0	12	118.0	27	143.0	6
94.0	19	119.0	24	145.0	3
95.0	15	120.0	33	146.0	3
96.0	11	121.0	18	147.0	3
97.0	19	122.0	21		
98.0	23	123.0	12		
99.0	30	124.0	15		

TENSILE STRAIN AT RUPTURE (ER),CRS=0.002 IN/MIN,TP-H1011 A&B PROPELLENT



TENSILE STRESS AT RUPTURE (SR), CHS=0.002 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 4

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
73.0	9	100.0	34	125.0	11
75.0	15	101.0	24	126.0	38
77.0	13	102.0	22	127.0	26
78.0	5	103.0	40	128.0	38
79.0	9	104.0	20	129.0	25
80.0	30	105.0	30	130.0	12
81.0	16	106.0	23	131.0	19
82.0	7	107.0	28	132.0	18
83.0	17	108.0	44	133.0	14
84.0	16	109.0	19	134.0	16
85.0	5	110.0	28	135.0	21
86.0	40	111.0	24	137.0	21
87.0	27	112.0	29	138.0	12
88.0	33	113.0	41	139.0	6
89.0	16	114.0	15	140.0	19
90.0	7	115.0	16	141.0	9
91.0	15	116.0	27	142.0	12
92.0	7	117.0	12	143.0	6
93.0	12	118.0	27	145.0	3
94.0	10	119.0	24	146.0	3
95.0	12	120.0	33	147.0	3
96.0	11	121.0	16		
97.0	17	122.0	21		
98.0	23	123.0	12		
99.0	33	124.0	16		

TENSILE STRESS AT RUPTURE (SR),C.I.S=0.002 IN/MIN,TP-H1011 A&B PROPELLENT

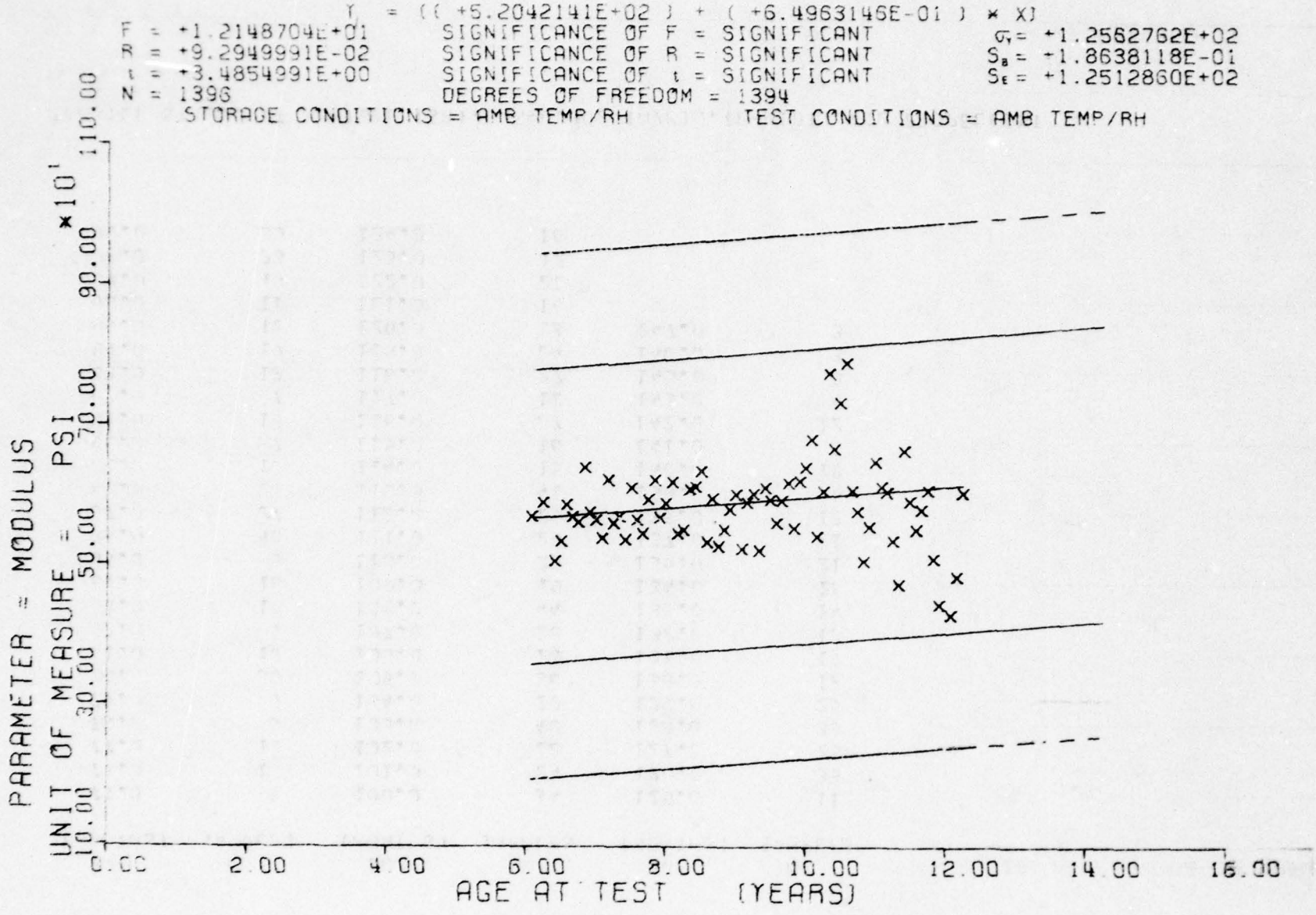
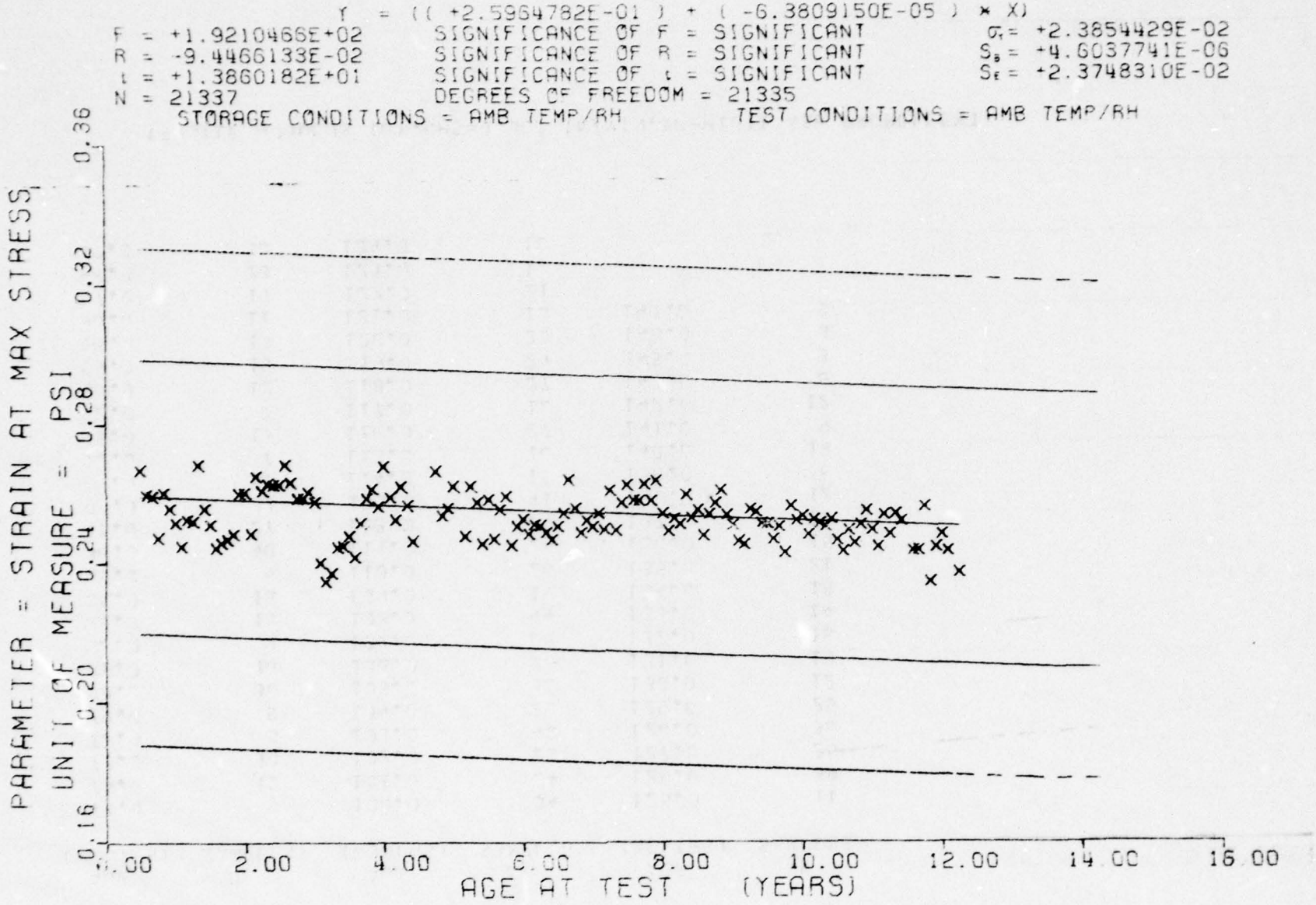

Y = ((+5.2042141E+02) + (+6.4963146E-01) * X)
F = +1.2148704E+01
R = +9.2949991E-02
t = +3.4854991E+00
N = 1396
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 1394
σy = +1.2562762E+02
Sa = +1.8638118E-01
Sε = +1.2512860E+02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
*10¹
110.00
90.00
70.00
50.00
30.00
10.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE MODULUS (E),CHS=0.002 IN/MIN,TP-H1011 A&B PROPELLENT

Figure 5

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
73.0	9	100.0	34	125.0	11
75.0	15	101.0	24	126.0	38
77.0	13	102.0	22	127.0	26
78.0	3	103.0	40	128.0	38
79.0	9	104.0	20	129.0	25
80.0	30	105.0	36	130.0	12
81.0	16	106.0	28	131.0	19
82.0	9	107.0	29	132.0	15
83.0	13	108.0	44	133.0	14
84.0	16	109.0	19	134.0	18
85.0	6	110.0	28	135.0	21
86.0	40	111.0	24	136.0	15
87.0	27	112.0	29	137.0	21
88.0	23	113.0	41	138.0	12
89.0	19	114.0	15	139.0	6
90.0	7	115.0	16	140.0	18
91.0	15	116.0	27	141.0	9
92.0	7	117.0	12	142.0	12
93.0	12	118.0	27	143.0	6
94.0	19	119.0	24	145.0	3
95.0	13	120.0	33	146.0	3
96.0	11	121.0	15	147.0	3
97.0	19	122.0	21		
98.0	23	123.0	12		
99.0	33	124.0	16		

TENSILE MODULUS (E),CMS=0.002 IN/MIN,TP-H1011 A&B PROPELLENT



TENSILE STRAIN AT MAX STRESS (EM), CHS=2.0 IN/MIN, TP-H1011 A&2 PROPELLENT

Figure 6

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	[illegible]	31.0	307	59.0	18	85.0	307	110.0	171
7.0	53	32.0	215	60.0	42	86.0	144	111.0	171
[illegible]	53	33.0	114	62.0	24	87.0	470	112.0	302
9.0	43	34.0	91	63.0	51	88.0	682	113.0	193
10.0	37	35.0	57	64.0	81	89.0	783	114.0	213
11.0	41	36.0	63	65.0	42	90.0	506	115.0	139
12.0	48	37.0	56	66.0	96	91.0	558	116.0	201
13.0	44	38.0	75	67.0	39	92.0	527	117.0	214
14.0	65	39.0	68	68.0	69	93.0	294	118.0	211
15.0	43	40.0	54	69.0	97	94.0	359	119.0	153
16.0	68	41.0	84	70.0	89	95.0	302	120.0	173
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	75	43.0	241	72.0	142	97.0	140	122.0	[illegible]
19.0	127	44.0	158	73.0	99	98.0	235	123.0	[illegible]
20.0	65	45.0	194	74.0	133	99.0	219	124.0	124
21.0	85	46.0	136	75.0	252	100.0	219	125.0	171
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	90	48.0	36	77.0	157	102.0	174	127.0	147
24.0	341	49.0	27	78.0	153	103.0	189	128.0	153
25.0	210	50.0	17	79.0	134	104.0	151	129.0	157
26.0	251	51.0	16	80.0	194	105.0	217	130.0	123
27.0	391	52.0	21	81.0	153	106.0	274	131.0	153
[illegible]	354	53.0	6	82.0	260	107.0	153	132.0	101
[illegible]	317	57.0	6	83.0	166	108.0	254	133.0	73
[illegible]	392	58.0	18	84.0	185	109.0	197	134.0	73
								135.0	99
								136.0	135
								137.0	66
								139.0	96
								140.0	49
								141.0	49
								142.0	52
								143.0	39
								144.0	30
								145.0	27
								147.0	27

TENSILE STRAIN AT MAX STRESS (EM),CHS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT

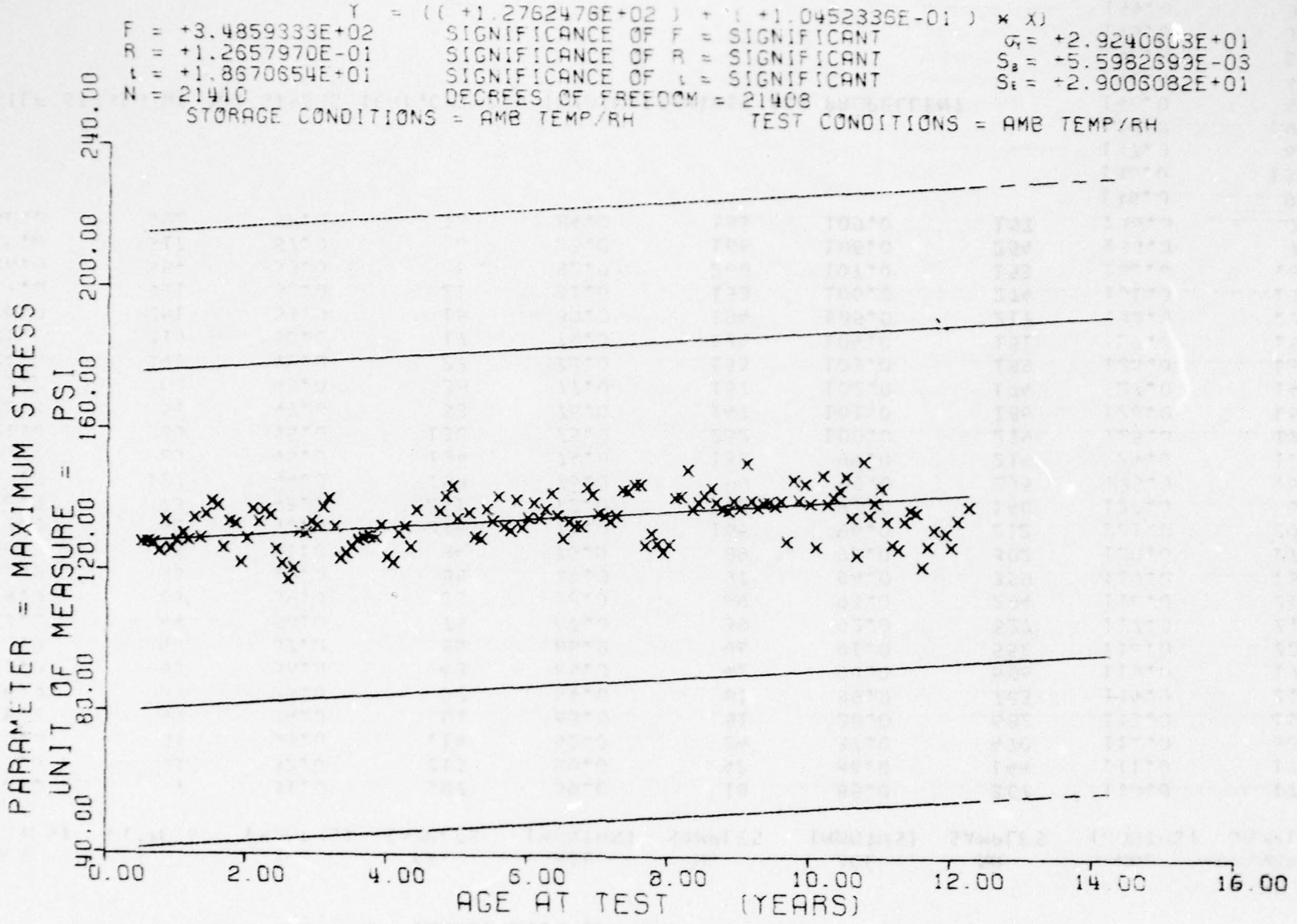
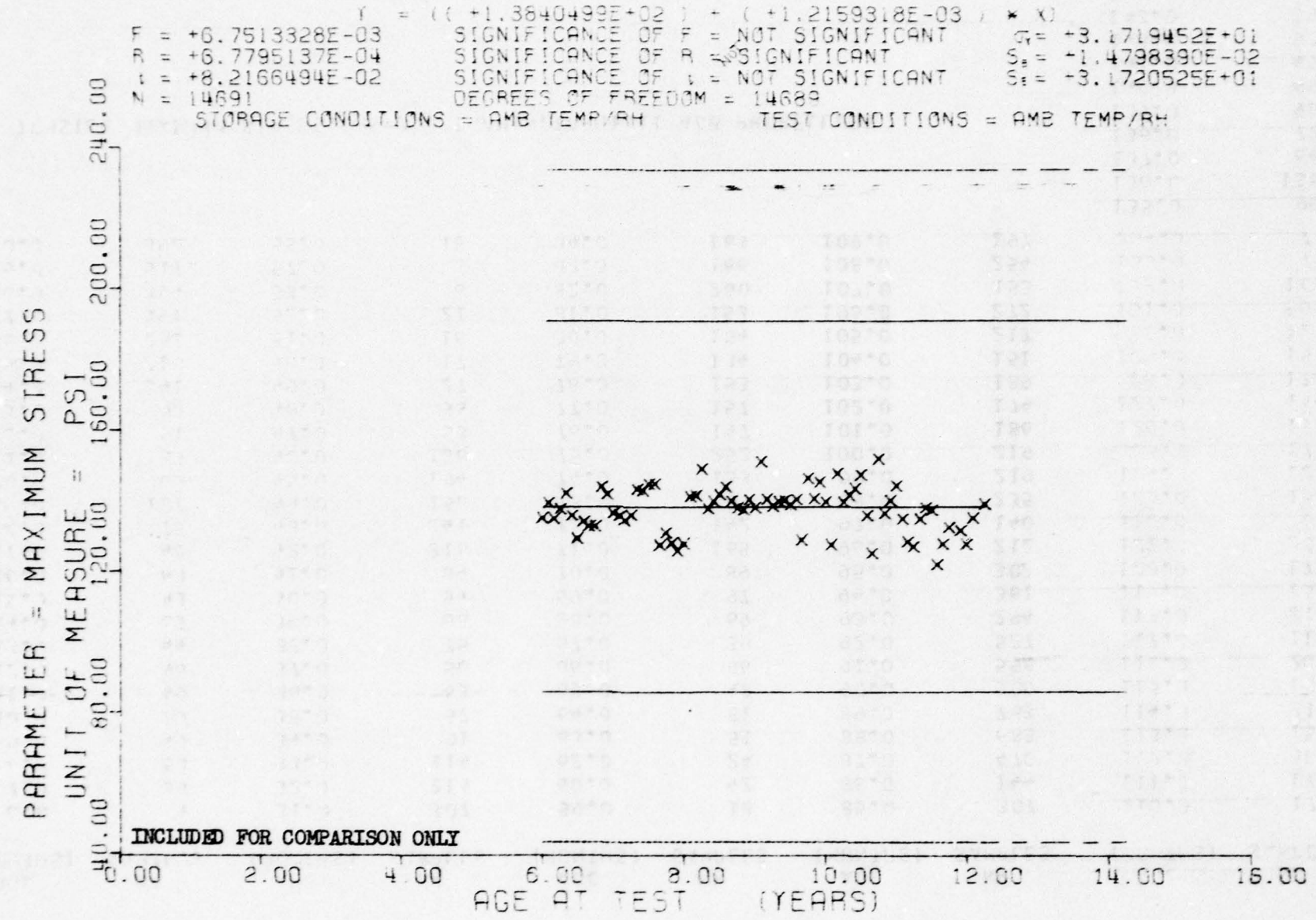

Y = ((+1.2762476E+02) + (+1.0452336E-01) * X)
F = +3.4859333E+02
SIGNIFICANCE OF F = SIGNIFICANT
σ = +2.9240603E+01
R = +1.2657970E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sa = +5.5982693E-03
t = +1.8670654E+01
SIGNIFICANCE OF t = SIGNIFICANT
Se = +2.9006082E+01
N = 21410
DEGREES OF FREEDOM = 21408
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
240.00
200.00
160.00
120.00
80.00
40.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE MAXIMUM STRESS, CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 7

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	4	31.0	307	59.0	18	85.0	307	113.0	171
7.0	33	32.0	215	60.0	42	86.0	144	111.0	174
8.0	53	33.0	114	62.0	24	87.0	470	112.0	302
9.0	47	34.0	91	63.0	51	88.0	683	113.0	153
10.0	67	35.0	57	64.0	81	89.0	783	114.0	213
11.0	43	36.0	63	65.0	42	90.0	500	115.0	169
12.0	49	37.0	56	66.0	96	91.0	558	116.0	204
13.0	44	38.0	75	67.0	39	92.0	527	117.0	214
14.0	65	39.0	66	68.0	69	93.0	294	118.0	210
15.0	43	40.0	54	69.0	97	94.0	361	119.0	153
16.0	63	41.0	84	70.0	89	95.0	302	120.0	179
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	75	43.0	241	72.0	142	97.0	140	122.0	68
19.0	127	44.0	158	73.0	99	98.0	235	123.0	156
20.0	62	45.0	194	74.0	133	99.0	219	124.0	124
21.0	35	46.0	136	75.0	252	100.0	219	125.0	174
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	90	48.0	56	77.0	157	102.0	174	127.0	147
24.0	341	49.0	27	78.0	153	103.0	189	128.0	134
25.0	213	50.0	17	79.0	134	104.0	151	129.0	157
26.0	252	51.0	16	80.0	194	105.0	217	130.0	123
27.0	291	52.0	21	81.0	153	106.0	272	131.0	152
28.0	354	53.0	8	82.0	200	107.0	153	132.0	161
29.0	517	57.0	8	83.0	166	108.0	254	133.0	75
30.0	392	58.0	18	84.0	183	109.0	197	134.0	73
								135.0	99
								136.0	135
								137.0	66
								138.0	72
								139.0	96
								140.0	49
								141.0	49
								142.0	92
								143.0	39
								144.0	38
								145.0	27
								147.0	27

TENSILE MAXIMUM STRESS,CMS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT



TENSILE MAXIMUM STRESS, CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 7A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	142	97.0	140	122.0	66
73.0	99	98.0	235	123.0	156
74.0	133	99.0	219	124.0	124
75.0	252	100.0	219	125.0	171
76.0	147	101.0	186	126.0	152
77.0	157	102.0	174	127.0	147
78.0	153	103.0	189	128.0	138
79.0	134	104.0	151	129.0	157
80.0	194	105.0	217	130.0	123
81.0	153	106.0	272	131.0	159
82.0	260	107.0	153	132.0	161
83.0	166	108.0	254	133.0	75
84.0	183	109.0	197	134.0	75
85.0	307	110.0	171	135.0	99
86.0	144	111.0	171	136.0	135
87.0	470	112.0	302	137.0	66
88.0	683	113.0	155	138.0	72
89.0	783	114.0	213	139.0	96
90.0	506	115.0	199	140.0	49
91.0	558	116.0	201	141.0	49
92.0	527	117.0	214	143.0	39
93.0	294	118.0	210	144.0	36
94.0	361	119.0	153	145.0	27
95.0	302	120.0	170	147.0	27
96.0	212	121.0	207		

TENSILE MAXIMUM STRESS,CHS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT

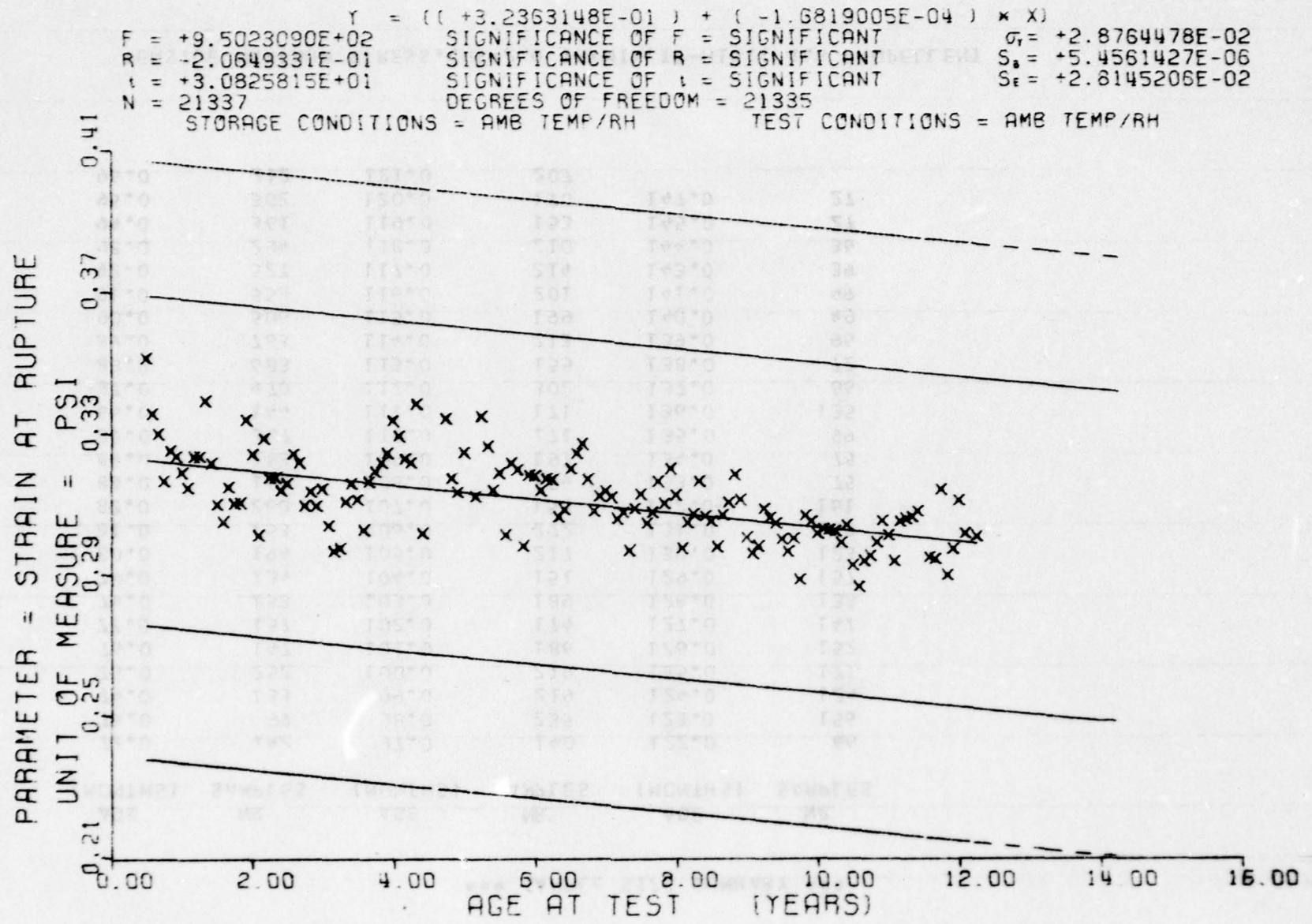
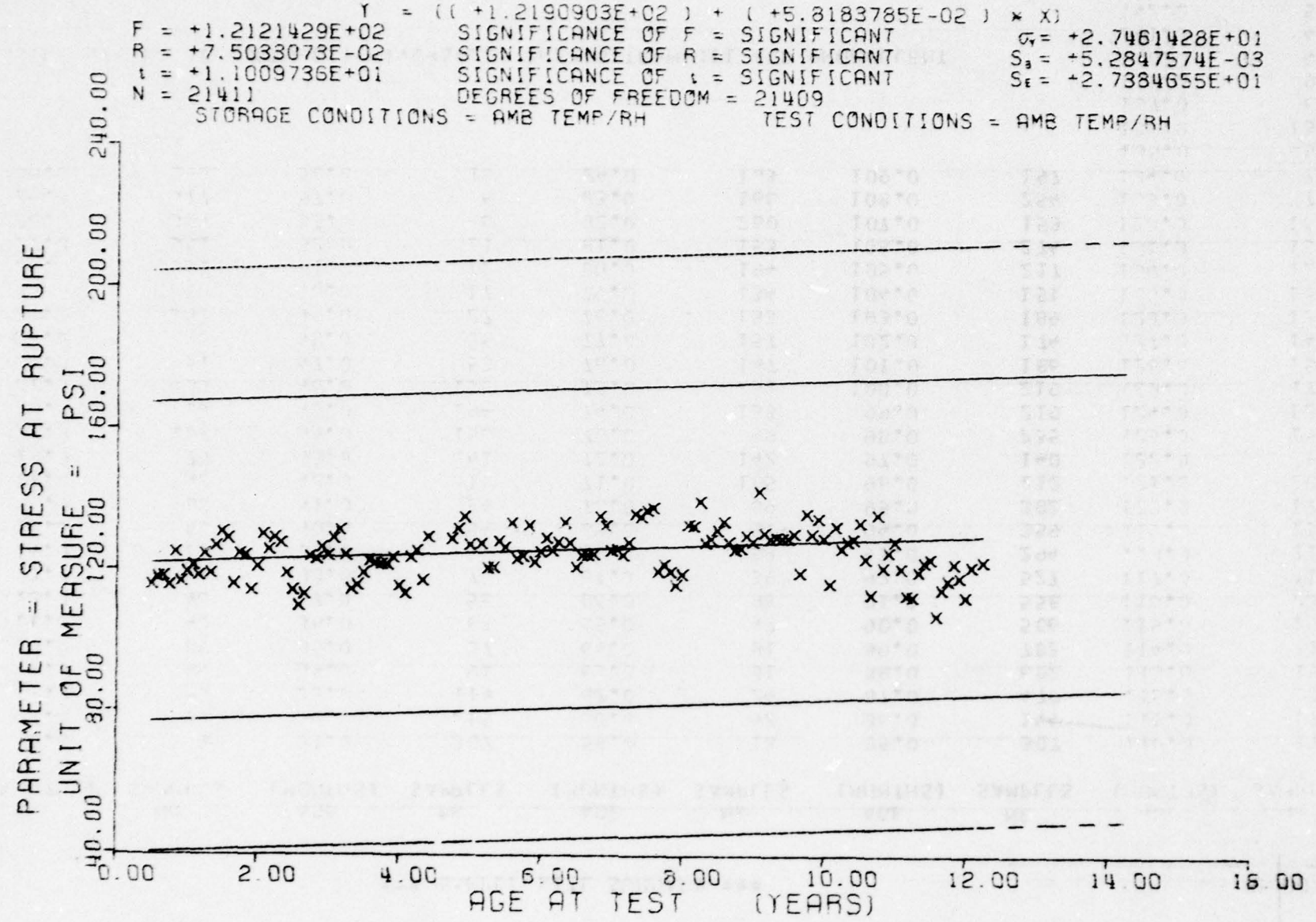

Y = ((+3.2363148E-01) + (-1.6819005E-04) * X)
F = +9.5023090E+02
R = -2.0649331E-01
t = +3.0825815E+01
N = 21337
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 21335
σr = +2.8764478E-02
Sa = +5.4561427E-06
Sε = +2.8145206E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.41
0.37
0.33
0.29
0.25
0.21
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE STRAIN AT RUPTURE (ER),CHS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT

Figure 8

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	4	31.0	367	59.0	13	85.0	307	110.0	171
7.0	[illegible]	32.0	215	60.0	42	86.0	144	111.0	171
[illegible]	53	33.0	114	62.0	24	87.0	470	112.0	232
9.0	49	34.0	91	63.0	51	88.0	682	113.0	153
10.0	89	35.0	57	64.0	81	89.0	783	114.0	213
11.0	40	36.0	63	65.0	42	90.0	506	115.0	199
12.0	46	37.0	58	66.0	96	91.0	558	116.0	201
13.0	44	38.0	75	67.0	39	92.0	527	117.0	214
14.0	60	39.0	66	68.0	69	93.0	294	118.0	210
15.0	43	40.0	54	69.0	97	94.0	359	119.0	157
16.0	60	41.0	84	70.0	89	95.0	302	120.0	170
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	75	43.0	241	72.0	142	97.0	140	122.0	60
19.0	127	44.0	156	73.0	99	98.0	235	123.0	156
20.0	[illegible]	45.0	194	74.0	133	99.0	219	124.0	124
21.0	[illegible]	46.0	138	75.0	252	100.0	219	125.0	171
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	90	48.0	36	77.0	157	102.0	174	127.0	147
24.0	[illegible]	49.0	27	78.0	153	103.0	189	128.0	133
25.0	210	50.0	17	79.0	134	104.0	151	129.0	137
26.0	251	51.0	16	80.0	194	105.0	217	130.0	123
27.0	261	52.0	21	81.0	153	106.0	274	131.0	159
28.0	354	53.0	6	82.0	260	107.0	153	132.0	161
29.0	317	57.0	6	83.0	166	108.0	254	133.0	75
30.0	292	58.0	18	24.0	163	109.0	197	134.0	75
								135.0	99
								136.0	135
								137.0	64
								139.0	96
								140.0	49
								141.0	49
								142.0	52
								143.0	39
								144.0	36
								145.0	27
								147.0	27

TENSILE STRAIN AT RUPTURE (ER), CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT



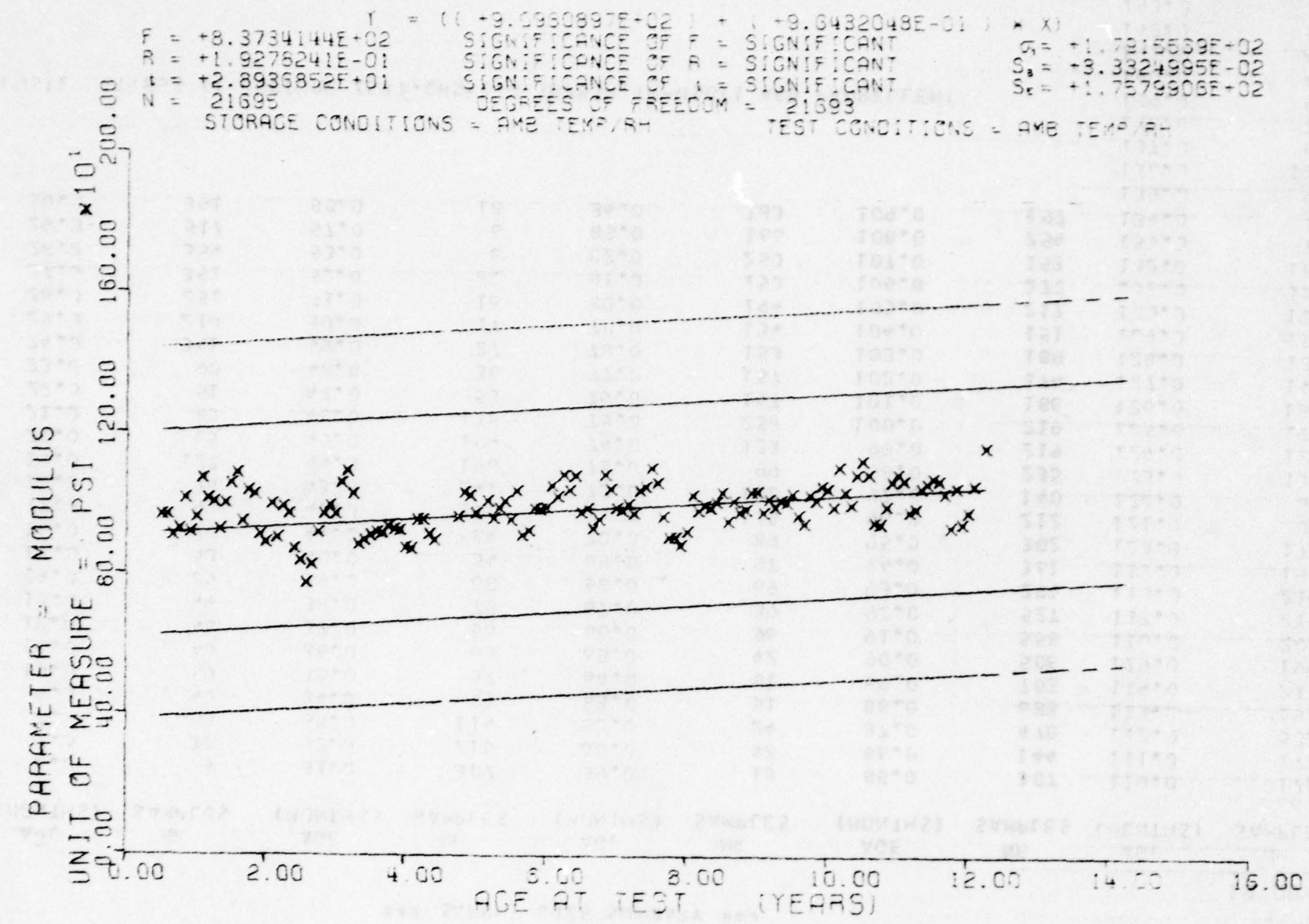
TENSILE STRESS AT RUPTURE (SR), CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 9

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	4	31.0	307	59.0	18	85.0	307	110.0	171
7.0	33	32.0	215	60.0	42	86.0	144	111.0	171
8.0	53	33.0	114	62.0	24	87.0	470	112.0	302
9.0	49	34.0	91	63.0	51	88.0	683	113.0	155
10.0	89	35.0	57	64.0	81	89.0	783	114.0	213
11.0	40	36.0	63	65.0	42	90.0	506	115.0	199
12.0	46	37.0	56	66.0	96	91.0	558	116.0	201
13.0	44	38.0	75	67.0	39	92.0	527	117.0	214
14.0	65	39.0	68	68.0	69	93.0	294	118.0	210
15.0	43	40.0	54	69.0	97	94.0	361	119.0	153
16.0	70	41.0	84	70.0	89	95.0	302	120.0	170
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	75	43.0	241	72.0	142	97.0	140	122.0	86
19.0	127	44.0	158	73.0	99	98.0	235	123.0	156
20.0	65	45.0	194	74.0	133	99.0	219	124.0	124
21.0	85	46.0	136	75.0	252	100.0	219	125.0	171
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	90	48.0	36	77.0	157	102.0	174	127.0	147
24.0	341	49.0	27	78.0	153	103.0	189	128.0	133
25.0	210	50.0	17	79.0	134	104.0	151	129.0	157
26.0	251	51.0	16	80.0	194	105.0	217	130.0	123
27.0	391	52.0	21	81.0	153	106.0	272	131.0	159
28.0	354	53.0	6	82.0	260	107.0	153	132.0	161
29.0	317	57.0	6	83.0	166	108.0	254	133.0	75
30.0	391	58.0	18	84.0	183	109.0	197	134.0	75
								135.0	99
								136.0	135
								137.0	66
								138.0	72
								139.0	96
								140.0	49
								141.0	49
								142.0	52
								143.0	39
								144.0	36
								145.0	27
								147.0	27

TENSILE STRESS AT RUPTURE (SR),CHS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT



TENSILE MODULUS (E), CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 10

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	4	31.0	307	59.0	18	85.0	307	110.0	168
7.0	33	32.0	215	60.0	42	86.0	144	111.0	171
8.0	53	33.0	114	62.0	24	87.0	470	112.0	302
9.0	49	34.0	91	63.0	51	88.0	682	113.0	155
10.0	89	35.0	57	64.0	81	89.0	783	114.0	213
11.0	40	36.0	63	65.0	42	90.0	506	115.0	193
12.0	46	37.0	56	66.0	96	91.0	558	116.0	201
13.0	44	38.0	75	67.0	39	92.0	527	117.0	208
14.0	65	39.0	68	68.0	69	93.0	294	118.0	210
15.0	43	40.0	54	69.0	97	94.0	360	119.0	153
16.0	70	41.0	84	70.0	89	95.0	302	120.0	173
17.0	42	42.0	216	71.0	165	96.0	212	121.0	207
18.0	15	43.0	241	72.0	142	97.0	140	122.0	66
19.0	127	44.0	158	73.0	99	98.0	235	123.0	156
20.0	65	45.0	194	74.0	133	99.0	216	124.0	127
21.0	33	46.0	136	75.0	252	100.0	219	125.0	173
22.0	51	47.0	53	76.0	147	101.0	186	126.0	152
23.0	79	48.0	36	77.0	157	102.0	174	127.0	150
24.0	336	49.0	27	78.0	154	103.0	183	128.0	138
25.0	213	50.0	17	79.0	134	104.0	151	129.0	150
26.0	252	51.0	16	80.0	194	105.0	217	130.0	125
27.0	191	52.0	21	81.0	153	106.0	272	131.0	162
28.0	354	53.0	6	82.0	260	107.0	153	132.0	161
29.0	517	57.0	6	83.0	166	108.0	253	133.0	90
30.0	391	58.0	18	84.0	183	109.0	182	134.0	92
								135.0	141
								136.0	165
								137.0	123
								138.0	129
								139.0	168
								140.0	67
								141.0	67
								142.0	43
								143.0	39
								144.0	45
								145.0	27
								147.0	27

TENSILE MODULUS (E),CHS=2.0 IN/MIN,TP-H1011 A&B PROPELLENT

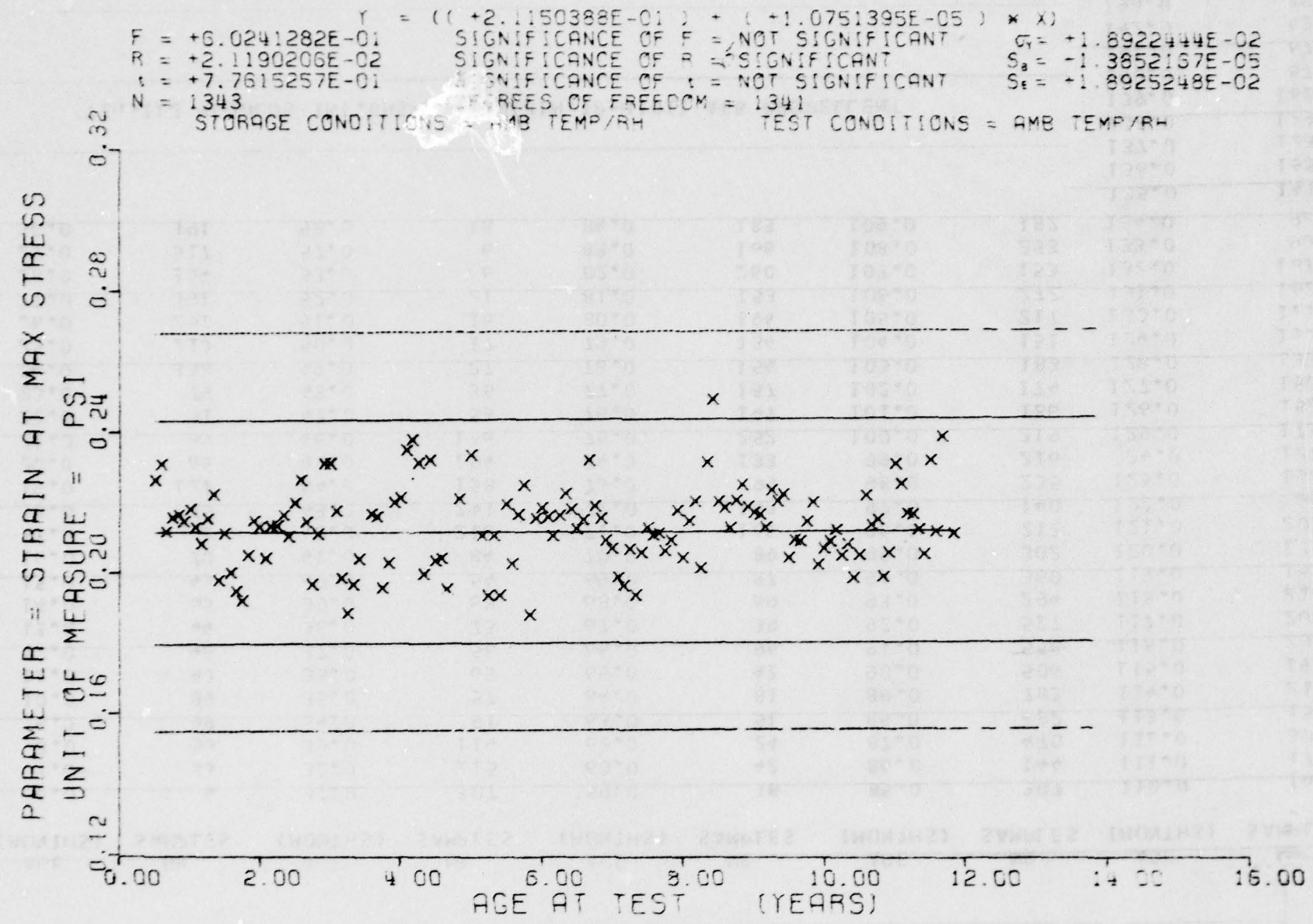

Y = ((+2.1150388E-01) + (+1.0751395E-05) * X)
F = +6.0241282E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = +2.1190206E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = +7.7615257E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 1343 DEGREES OF FREEDOM = 1341
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
σ_Y = +1.8922444E-02
S_a = -1.3852187E-05
S_t = +1.8925248E-02
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.12
0.16
0.20
0.24
0.28
0.32
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
BIAXIAL TENSILE STRAIN AT MAX STRESS (EM), CHS=0.2 IN/MIN, TP-H1011 A&B

Figure 11

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	[illegible]	31.0	13	58.0	2	85.0	11	110.0	3
7.0	[illegible]	32.0	[illegible]	60.0	1	86.0	18	111.0	[illegible]
[illegible]	[illegible]	33.0	7	62.0	2	87.0	11	112.0	10
[illegible]	[illegible]	34.0	12	63.0	1	88.0	14	113.0	[illegible]
10.0	[illegible]	35.0	11	64.0	1	89.0	26	114.0	[illegible]
11.0	7	36.0	10	65.0	1	90.0	34	115.0	11
12.0	7	37.0	4	66.0	2	91.0	23	116.0	[illegible]
13.0	[illegible]	38.0	10	67.0	2	92.0	37	117.0	[illegible]
14.0	7	39.0	5	68.0	1	93.0	30	118.0	[illegible]
15.0	13	40.0	11	69.0	2	94.0	20	119.0	[illegible]
16.0	7	41.0	3	70.0	2	95.0	11	120.0	12
17.0	[illegible]	43.0	5	71.0	4	96.0	10	121.0	11
18.0	7	44.0	20	72.0	3	97.0	9	122.0	10
19.0	10	45.0	39	73.0	9	98.0	1	123.0	[illegible]
20.0	20	46.0	32	74.0	4	99.0	3	124.0	[illegible]
21.0	15	47.0	31	75.0	5	100.0	5	125.0	[illegible]
22.0	12	48.0	8	76.0	9	101.0	2	126.0	[illegible]
23.0	15	49.0	9	77.0	12	102.0	4	127.0	[illegible]
24.0	29	50.0	1	78.0	7	103.0	4	128.0	[illegible]
[illegible]	[illegible]	51.0	3	79.0	16	104.0	9	129.0	[illegible]
26.0	[illegible]	52.0	1	80.0	5	105.0	[illegible]	130.0	[illegible]
[illegible]	27	53.0	2	81.0	10	106.0	9	131.0	[illegible]
28.0	[illegible]	54.0	[illegible]	82.0	15	107.0	10	132.0	[illegible]
29.0	31	55.0	7	83.0	13	108.0	11	133.0	[illegible]
30.0	37	56.0	4	84.0	11	109.0	12	134.0	[illegible]
								135.0	4
								136.0	4
								137.0	[illegible]
								138.0	3
								139.0	1
								140.0	1
								142.0	1

[illegible] TENSILE STRAIN AT MAX STRESS (EM),CHS=0.2 IN/MIN,TP-H1011 A&B

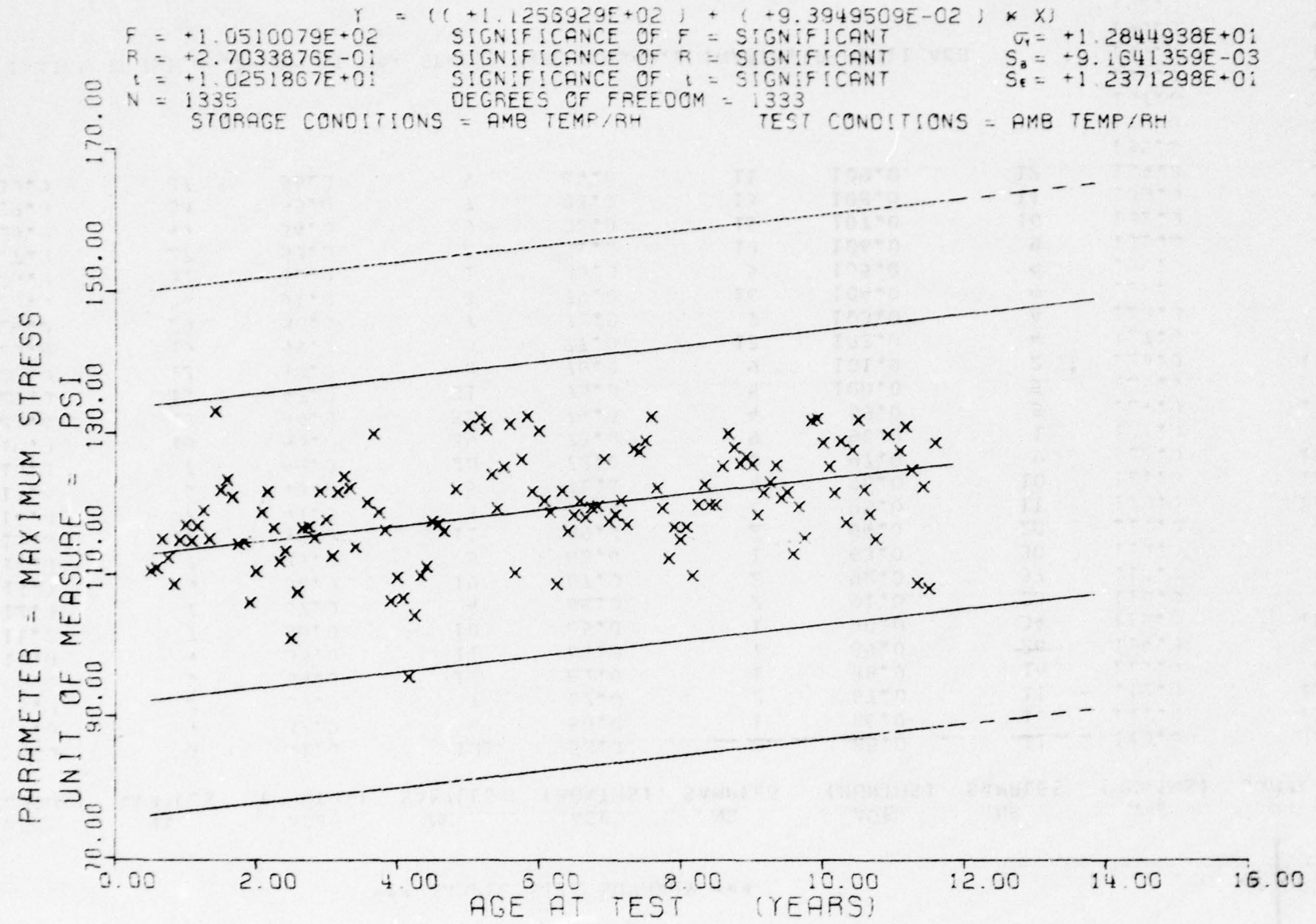
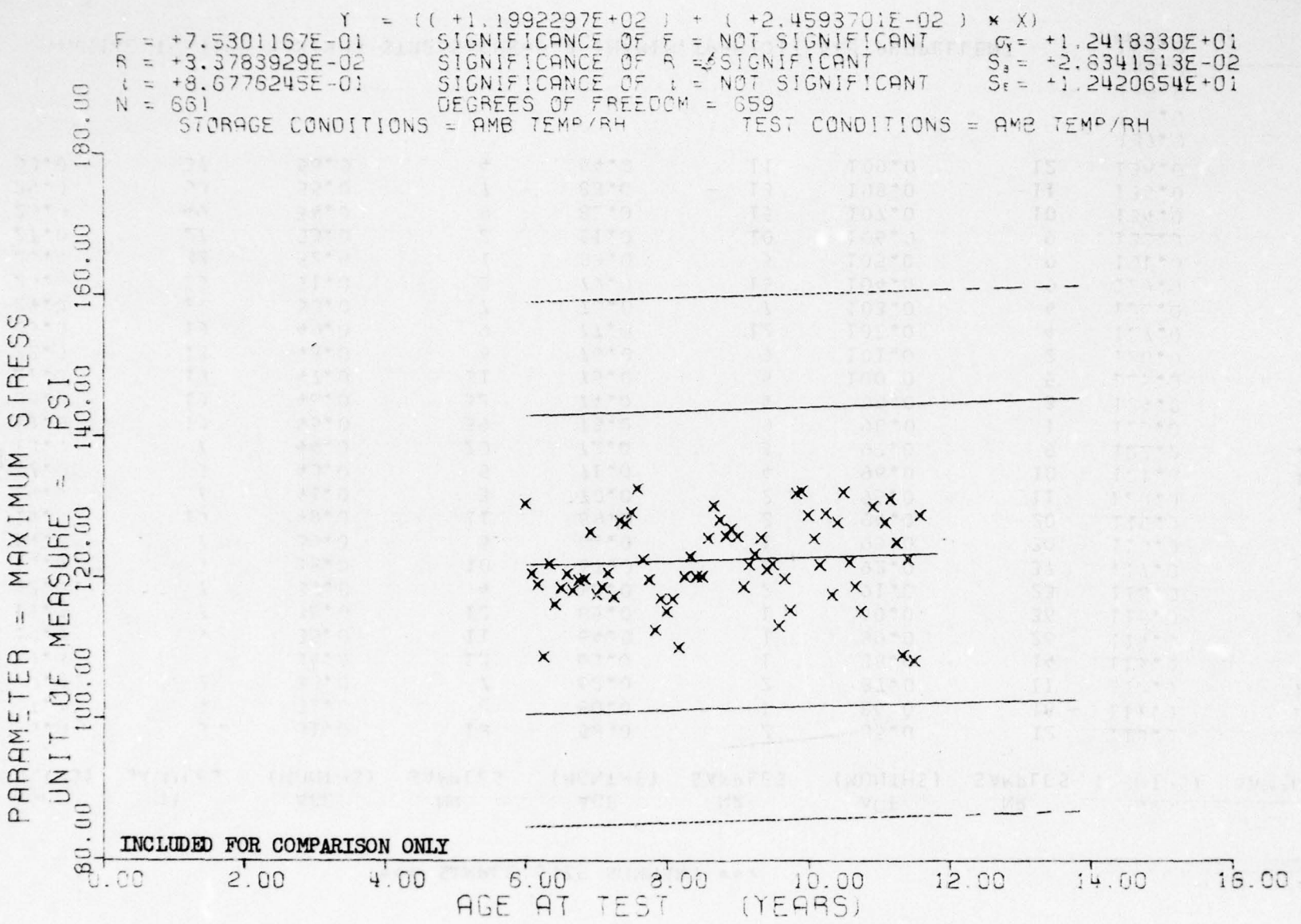

Y = ((+1.1256929E+02) + (+9.3949509E-02) * X)
F = +1.0510079E+02
SIGNIFICANCE OF F = SIGNIFICANT
σ_r = +1.2844938E+01
R = +2.7033876E-01
SIGNIFICANCE OF R = SIGNIFICANT
S_a = +9.1641359E-03
t = +1.0251867E+01
SIGNIFICANCE OF t = SIGNIFICANT
S_ε = +1.2371298E+01
N = 1335
DEGREES OF FREEDOM = 1333
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
170.00
150.00
130.00
110.00
90.00
70.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
BIAXIAL TENSILE MAXIMUM STRESS, CHS=0.2 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 12

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	[illegible]	31.0	18	58.0	2	35.0	12	[illegible]	[illegible]
[illegible]	[illegible]	32.0	8	60.0	1	86.0	18	[illegible]	[illegible]
[illegible]	2	33.0	7	62.0	2	87.0	11	[illegible]	[illegible]
[illegible]	[illegible]	34.0	12	[illegible]	1	88.0	14	[illegible]	[illegible]
10.0	[illegible]	35.0	11	64.0	1	89.0	26	[illegible]	[illegible]
11.0	[illegible]	36.0	10	65.0	1	90.0	36	115.0	11
12.0	[illegible]	37.0	4	66.0	2	91.0	23	[illegible]	[illegible]
13.0	[illegible]	38.0	10	67.0	2	92.0	37	[illegible]	[illegible]
[illegible]	[illegible]	39.0	[illegible]	[illegible]	1	93.0	30	[illegible]	[illegible]
[illegible]	10	40.0	11	69.0	2	94.0	20	[illegible]	[illegible]
[illegible]	[illegible]	41.0	3	70.0	2	95.0	11	[illegible]	12
[illegible]	[illegible]	43.0	5	71.0	4	96.0	10	[illegible]	11
[illegible]	[illegible]	44.0	20	72.0	3	97.0	9	[illegible]	[illegible]
19.0	19	45.0	39	73.0	9	98.0	1	[illegible]	[illegible]
20.0	19	46.0	32	74.0	4	99.0	3	124.0	12
[illegible]	[illegible]	47.0	31	75.0	5	100.0	5	[illegible]	[illegible]
22.0	12	48.0	8	76.0	9	101.0	2	[illegible]	11
[illegible]	13	49.0	9	77.0	12	102.0	4	[illegible]	[illegible]
24.0	[illegible]	50.0	7	[illegible]	1	103.0	4	[illegible]	[illegible]
[illegible]	[illegible]	51.0	3	[illegible]	16	104.0	9	[illegible]	[illegible]
[illegible]	32	52.0	1	80.0	5	105.0	9	[illegible]	[illegible]
27.0	21	53.0	2	81.0	10	106.0	9	[illegible]	[illegible]
[illegible]	49	54.0	9	82.0	15	107.0	10	134.0	3
[illegible]	[illegible]	55.0	7	83.0	13	108.0	11	135.0	4
30.0	37	56.0	4	84.0	11	109.0	12	136.0	[illegible]
								137.0	[illegible]
								138.0	3
								139.0	1
								140.0	1
								142.0	1

AXIAL TENSILE MAXIMUM STRESS,CHS=0.2 IN/MIN,TP-H1011 A&B PROPELLENT



BIAXIAL TENSILE MAXIMUM STRESS, CHS=0.2 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 12A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	142	97.0	140	122.0	66
73.0	99	98.0	235	123.0	156
74.0	133	99.0	219	124.0	124
75.0	252	100.0	219	125.0	171
76.0	147	101.0	186	126.0	152
77.0	157	102.0	174	127.0	147
78.0	153	103.0	189	128.0	138
79.0	154	104.0	151	129.0	157
80.0	194	105.0	217	130.0	123
81.0	153	106.0	274	131.0	159
82.0	260	107.0	153	132.0	161
83.0	166	108.0	254	133.0	75
84.0	183	109.0	197	134.0	75
85.0	307	110.0	171	135.0	99
86.0	144	111.0	171	136.0	135
87.0	470	112.0	302	137.0	66
88.0	682	113.0	155	139.0	96
89.0	783	114.0	213	140.0	49
90.0	506	115.0	199	141.0	49
91.0	558	116.0	201	143.0	39
92.0	527	117.0	214	144.0	36
93.0	294	118.0	210	145.0	27
94.0	359	119.0	153	147.0	27
95.0	302	120.0	170		
96.0	212	121.0	207		

BIAXIAL TENSILE MAXIMUM STRESS, .CHS=2.0 IN/MIN, TP-H1011 A&B PROPELLENT

Y = ((+2.3742360E-01) + (+1.2540250E-05) * X)

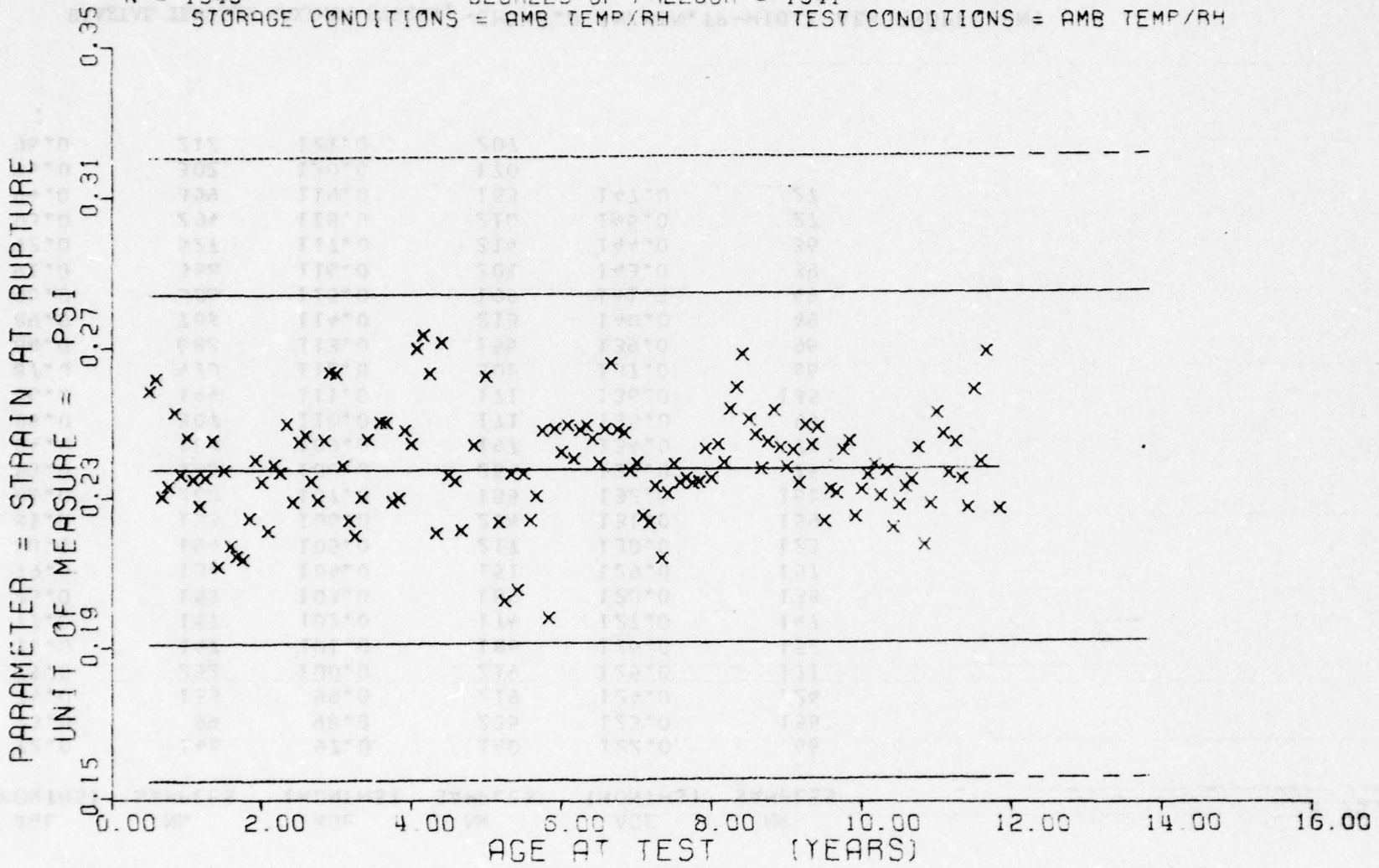
F = +3.8210204E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σ_T = +2.7710246E-02

R = +1.6877706E-02 SIGNIFICANCE OF R = SIGNIFICANT S_a = +2.0286939E-05

t = +6.1814403E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT S_ϵ = +2.7716627E-02

N = 1343 DEGREES OF FREEDOM = 1341

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



BIAXIAL TENSILE, STRAIN AT RUPTURE (ER), CHS=0.2 IN/MIN, TP-H1011 A&B

Figure 13

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	[illegible]	31.0	15	58.0	2	85.0	11	110.0	8
7.0	4	32.0	8	60.0	1	86.0	18	111.0	12
8.0	2	33.0	7	62.0	2	87.0	11	112.0	10
9.0	5	34.0	12	63.0	1	88.0	14	113.0	3
10.0	4	35.0	11	64.0	1	89.0	26	114.0	6
11.0	7	36.0	10	65.0	1	90.0	34	115.0	11
12.0	7	37.0	4	66.0	2	91.0	23	116.0	5
13.0	6	38.0	10	67.0	2	92.0	37	117.0	6
14.0	7	39.0	9	68.0	1	93.0	30	118.0	5
15.0	10	40.0	11	69.0	2	94.0	20	119.0	4
16.0	7	41.0	3	70.0	2	95.0	11	120.0	12
17.0	5	43.0	5	71.0	4	96.0	10	121.0	11
18.0	7	44.0	20	72.0	3	97.0	9	122.0	10
19.0	10	45.0	39	73.0	9	98.0	1	123.0	6
20.0	13	46.0	32	74.0	4	99.0	3	124.0	12
21.0	10	47.0	21	75.0	5	100.0	5	125.0	7
22.0	12	48.0	8	76.0	9	101.0	2	126.0	11
23.0	13	49.0	9	77.0	12	102.0	4	127.0	6
24.0	23	50.0	7	78.0	7	103.0	4	128.0	3
25.0	33	51.0	5	79.0	16	104.0	9	129.0	7
26.0	32	52.0	1	80.0	5	105.0	9	130.0	7
27.0	22	53.0	2	81.0	10	106.0	9	131.0	4
28.0	40	54.0	9	82.0	15	107.0	10	132.0	4
29.0	30	55.0	7	83.0	13	108.0	11	133.0	4
30.0	37	56.0	4	84.0	11	109.0	12	134.0	3
								135.0	4
								136.0	4
								137.0	6
								138.0	3
								139.0	1
								140.0	1
								142.0	1

UNIAXIAL TENSILE,STRAIN AT RUPTURE (EF),CHS=0.2 IN/MIN,TP-H1011 A&B

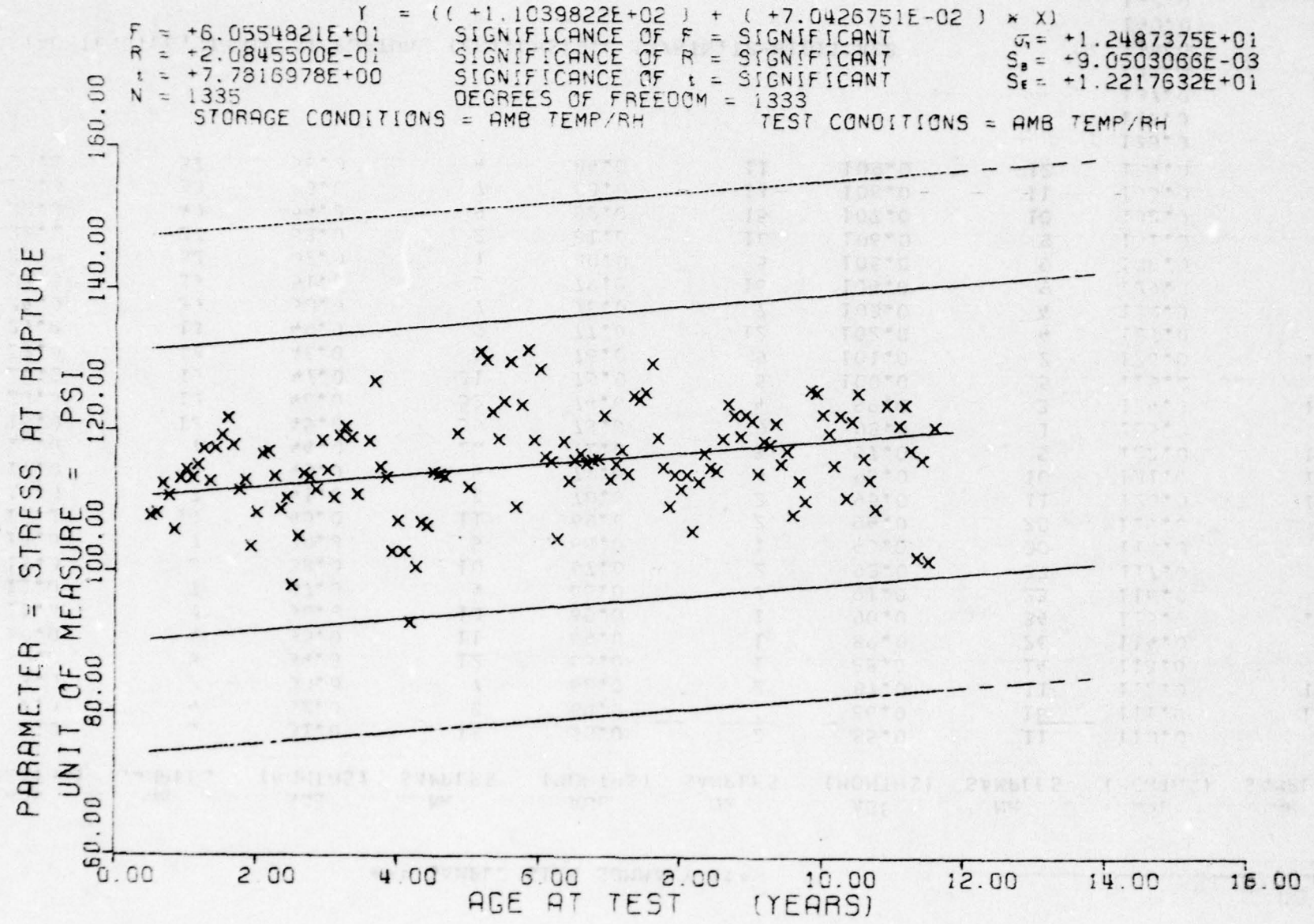
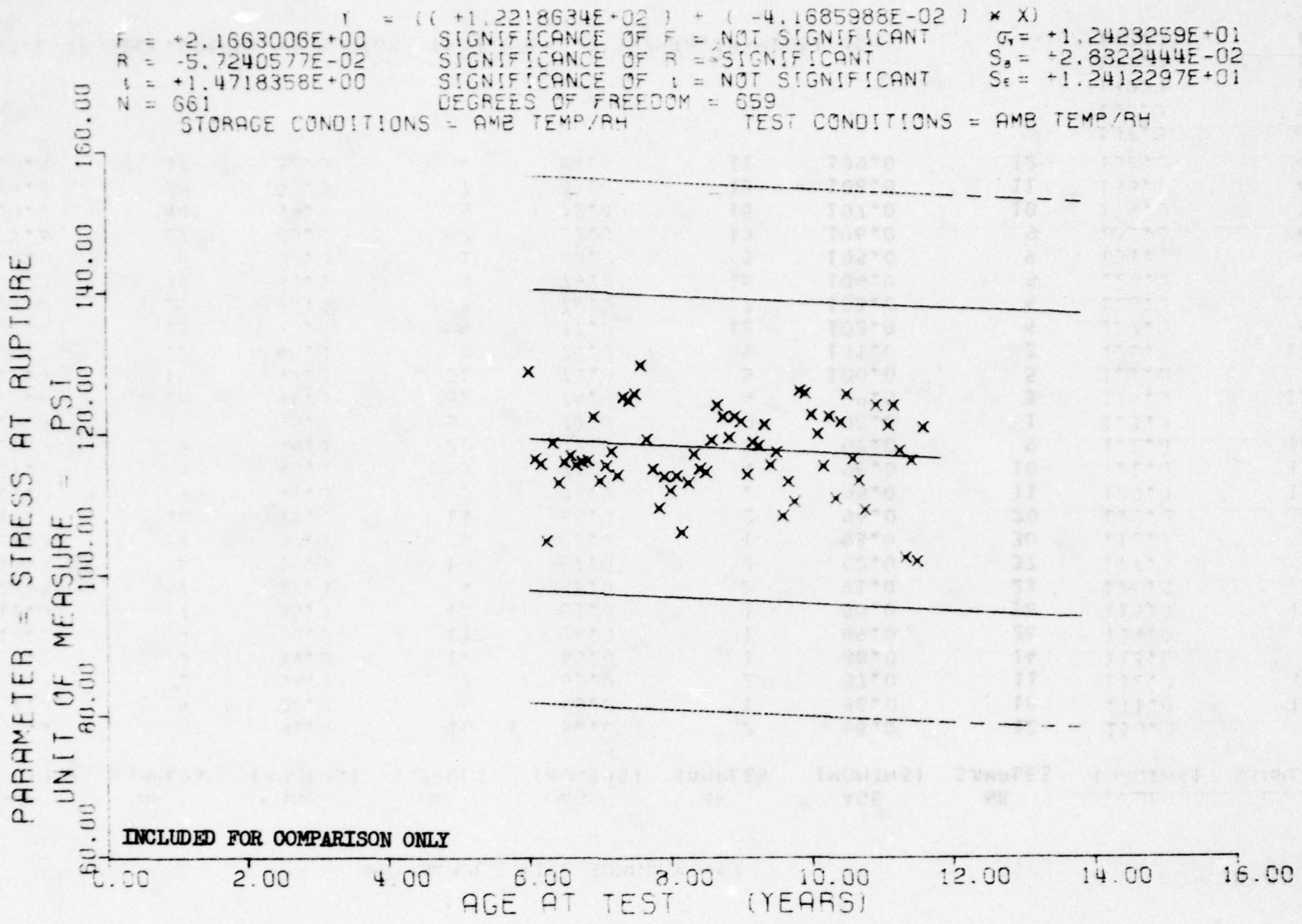

Y = ((+1.1039822E+02) + (+7.0426751E-02) * X)
F = +6.0554821E+01
R = +2.0845500E-01
t = +7.7816978E+00
N = 1335
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 1333
σ1 = +1.2487375E+01
Sb = +9.0503066E-03
Se = +1.2217632E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
160.00
140.00
120.00
100.00
80.00
60.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
BIAXIAL TENSILE,STRESS AT RUPTURE (SR),CHS=0.2 IN/MIN,TP-H1011 A&B

Figure 14

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	[illegible]	31.0	18	56.0	2	85.0	12	110.0	8
7.0	4	32.0	8	60.0	1	86.0	18	111.0	12
[illegible]	[illegible]	33.0	7	62.0	2	87.0	11	112.0	10
9.0	3	34.0	12	63.0	1	88.0	14	113.0	3
10.0	4	35.0	11	64.0	1	89.0	20	114.0	6
11.0	7	36.0	10	65.0	1	90.0	36	115.0	11
12.0	7	37.0	4	66.0	2	91.0	23	116.0	5
13.0	3	38.0	10	67.0	2	92.0	37	117.0	3
14.0	7	39.0	5	68.0	1	93.0	30	118.0	5
15.0	10	40.0	11	69.0	2	94.0	20	119.0	4
16.0	7	41.0	5	70.0	2	95.0	11	120.0	12
17.0	5	43.0	5	71.0	4	96.0	10	121.0	11
18.0	7	44.0	20	72.0	3	97.0	9	122.0	10
19.0	10	45.0	39	73.0	9	98.0	1	123.0	6
20.0	10	46.0	32	74.0	4	99.0	3	124.0	12
21.0	15	47.0	31	75.0	5	100.0	5	125.0	2
22.0	22	48.0	8	76.0	9	101.0	2	126.0	11
23.0	13	49.0	9	77.0	12	102.0	4	127.0	6
24.0	29	50.0	7	78.0	7	103.0	4	128.0	3
25.0	32	51.0	3	79.0	16	104.0	9	129.0	7
26.0	32	52.0	1	80.0	5	105.0	9	131.0	4
27.0	27	53.0	2	81.0	10	106.0	9	132.0	6
28.0	49	54.0	9	82.0	15	107.0	10	134.0	3
29.0	30	55.0	7	83.0	13	108.0	11	135.0	4
30.0	37	56.0	4	84.0	11	109.0	12	136.0	4
								137.0	6
								138.0	3
								139.0	1
								140.0	1
								142.0	1

-1, ULTIMATE TENSILE STRESS AT RUPTURE (SR), CHS=0.2 IN/MIN, TP-H1011 A&B



BIAXIAL TENSILE, STRESS AT RUPTURE (SR), CHS=0.2 IN/MIN, TP-H1011 A&B

Figure 14A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	3	97.0	9	122.0	16
73.0	9	98.0	1	123.0	6
74.0	4	99.0	3	124.0	12
75.0	5	100.0	5	125.0	9
76.0	9	101.0	2	126.0	11
77.0	12	102.0	4	127.0	6
78.0	7	103.0	4	128.0	8
79.0	16	104.0	9	129.0	7
80.0	5	105.0	9	131.0	4
81.0	10	106.0	9	133.0	4
82.0	15	107.0	10	134.0	3
83.0	13	108.0	11	135.0	4
84.0	11	109.0	12	136.0	4
85.0	12	110.0	8	137.0	6
86.0	18	111.0	12	138.0	3
87.0	11	112.0	10	139.0	1
88.0	14	113.0	8	140.0	1
89.0	26	114.0	6	142.0	1
90.0	36	115.0	11		
91.0	23	116.0	5		
92.0	37	117.0	8		
93.0	30	118.0	5		
94.0	20	119.0	4		
95.0	11	120.0	12		
96.0	10	121.0	11		

BIAXIAL TENSILE,STRESS AT RUPTURE (SR),CHS=0.2 IN/MIN,TP-H1011 A&B

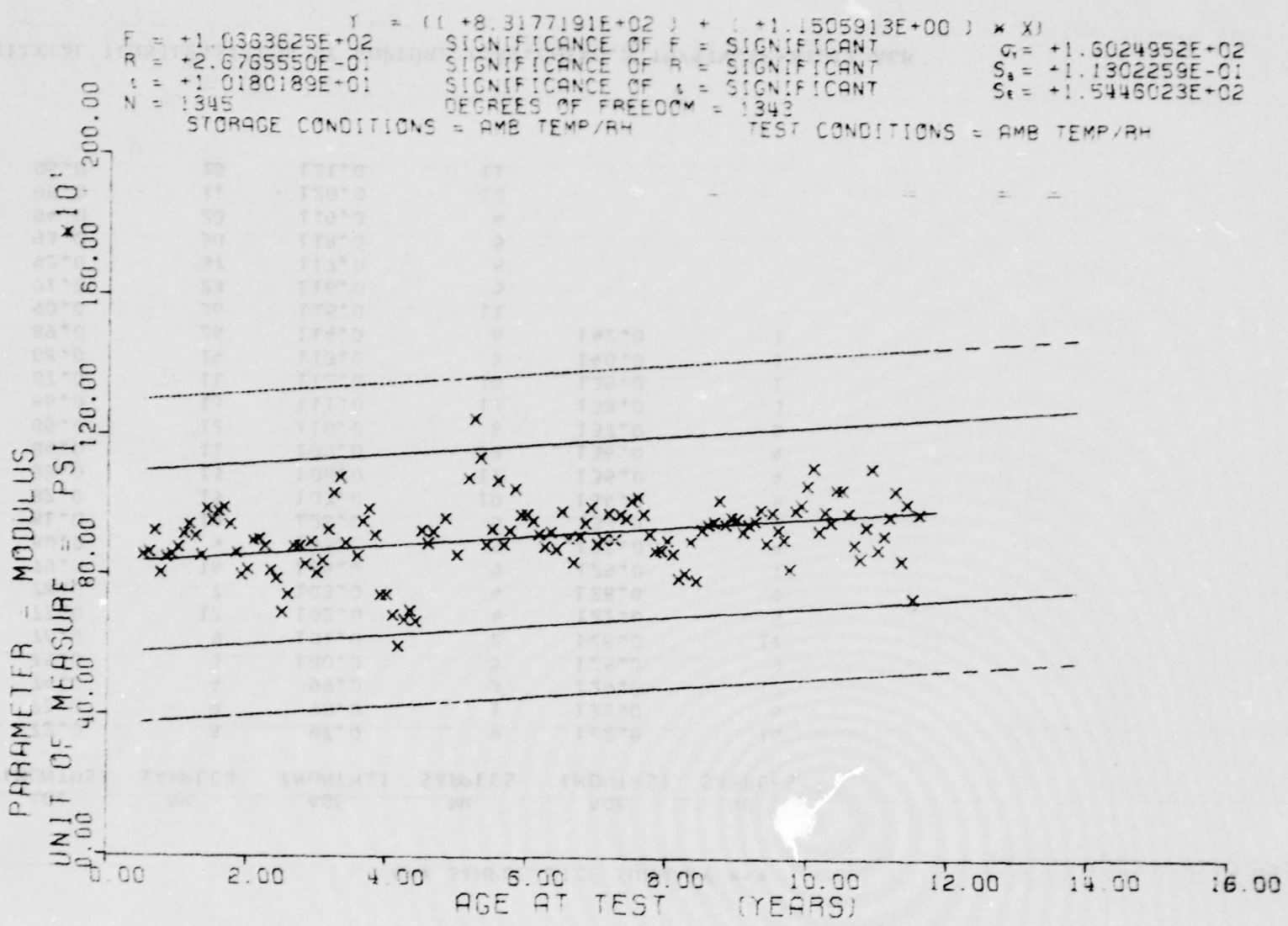
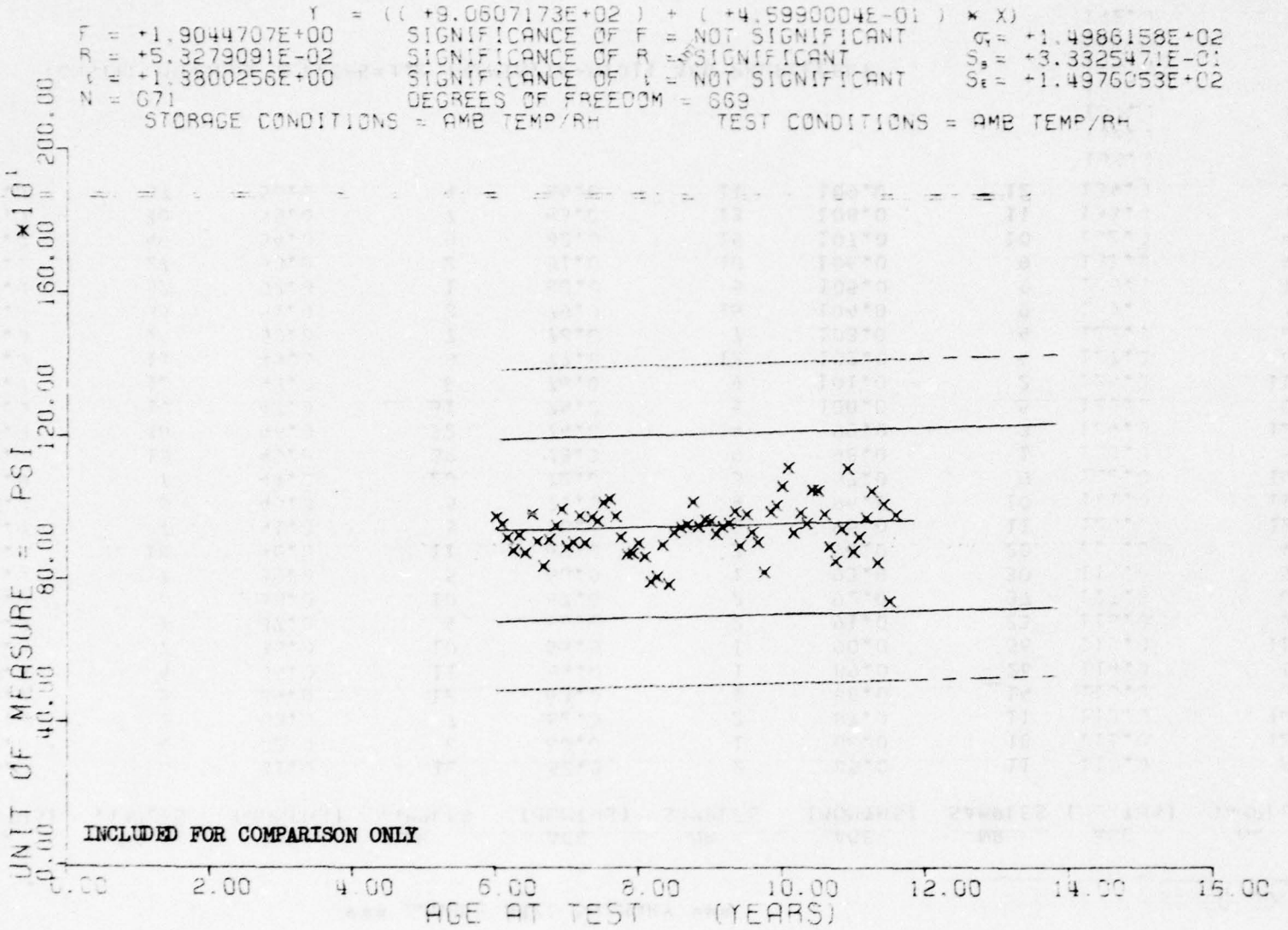

Y = ((+8.3177191E+02) + (+1.1505913E+00) * X)
F = +1.0363625E+02
SIGNIFICANCE OF F = SIGNIFICANT
σ1 = +1.6024952E+02
R = +2.6765550E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sa = +1.1302259E-01
t = +1.0180189E+01
SIGNIFICANCE OF t = SIGNIFICANT
Se = +1.5446023E+02
N = 1345
DEGREES OF FREEDOM = 1343
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER - MODULUS
UNIT OF MEASURE = PSI
x10¹
200.00
160.00
120.00
80.00
40.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE MODULUS (E),CHS=0.2 IN/MIN,TP-H1011 A&B PROPELLENT

Figure 15

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
6.0	3	31.0	16	58.0	2	85.0	11	110.0	8
7.0	4	32.0	6	60.0	1	86.0	18	111.0	12
8.0	2	33.0	7	62.0	2	87.0	11	112.0	10
9.0	5	34.0	12	63.0	1	88.0	14	113.0	3
10.0	4	35.0	11	64.0	1	89.0	26	114.0	5
11.0	7	36.0	10	65.0	1	90.0	36	115.0	11
12.0	7	37.0	4	66.0	2	91.0	23	116.0	5
13.0	6	38.0	10	67.0	2	92.0	37	117.0	6
14.0	7	39.0	5	68.0	1	93.0	30	118.0	5
15.0	10	40.0	11	69.0	2	94.0	20	119.0	4
16.0	7	41.0	3	70.0	2	95.0	11	120.0	12
17.0	5	43.0	5	71.0	4	96.0	10	121.0	11
18.0	7	44.0	20	72.0	3	97.0	9	122.0	16
19.0	10	45.0	38	73.0	9	98.0	1	123.0	5
20.0	10	46.0	32	74.0	4	99.0	3	124.0	12
21.0	15	47.0	31	75.0	5	100.0	5	125.0	6
22.0	12	48.0	8	76.0	9	101.0	2	126.0	11
23.0	13	49.0	9	77.0	12	102.0	4	127.0	6
24.0	29	50.0	7	78.0	7	103.0	4	128.0	6
25.0	32	51.0	3	79.0	16	104.0	9	129.0	7
26.0	32	52.0	1	80.0	5	105.0	9	130.0	7
27.0	27	53.0	2	81.0	10	106.0	9	131.0	4
28.0	45	54.0	9	82.0	15	107.0	10	132.0	4
29.0	30	55.0	7	83.0	13	108.0	11	133.0	1
30.0	37	56.0	4	84.0	11	109.0	12	134.0	3
								135.0	4
								136.0	4
								137.0	6
								138.0	3
								139.0	1
								140.0	1
								142.0	1

TENSILE MODULUS (E), CHS=0.2 IN/MIN, TP-H1011 A&B PROPELLENT



TENSILE MODULUS (E), CHS=0.2 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 15A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	3	97.0	9	122.0	16
73.0	9	98.0	1	123.0	6
74.0	4	99.0	3	124.0	12
75.0	5	100.0	5	125.0	9
76.0	9	101.0	2	126.0	11
77.0	12	102.0	4	127.0	6
78.0	7	103.0	4	128.0	8
79.0	16	104.0	9	129.0	7
80.0	5	105.0	9	130.0	7
81.0	10	106.0	9	131.0	4
82.0	15	107.0	10	132.0	4
83.0	13	108.0	11	133.0	4
84.0	11	109.0	12	134.0	3
85.0	11	110.0	8	135.0	4
86.0	18	111.0	12	136.0	4
87.0	11	112.0	10	137.0	6
88.0	14	113.0	8	138.0	3
89.0	26	114.0	6	139.0	1
90.0	36	115.0	11	140.0	1
91.0	23	116.0	5	142.0	1
92.0	37	117.0	8		
93.0	30	118.0	5		
94.0	20	119.0	4		
95.0	11	120.0	12		
96.0	10	121.0	11		

TENSILE MODULUS (E),CHS=0.2 IN/MIN,TP-H1011 A&B PROPELLENT

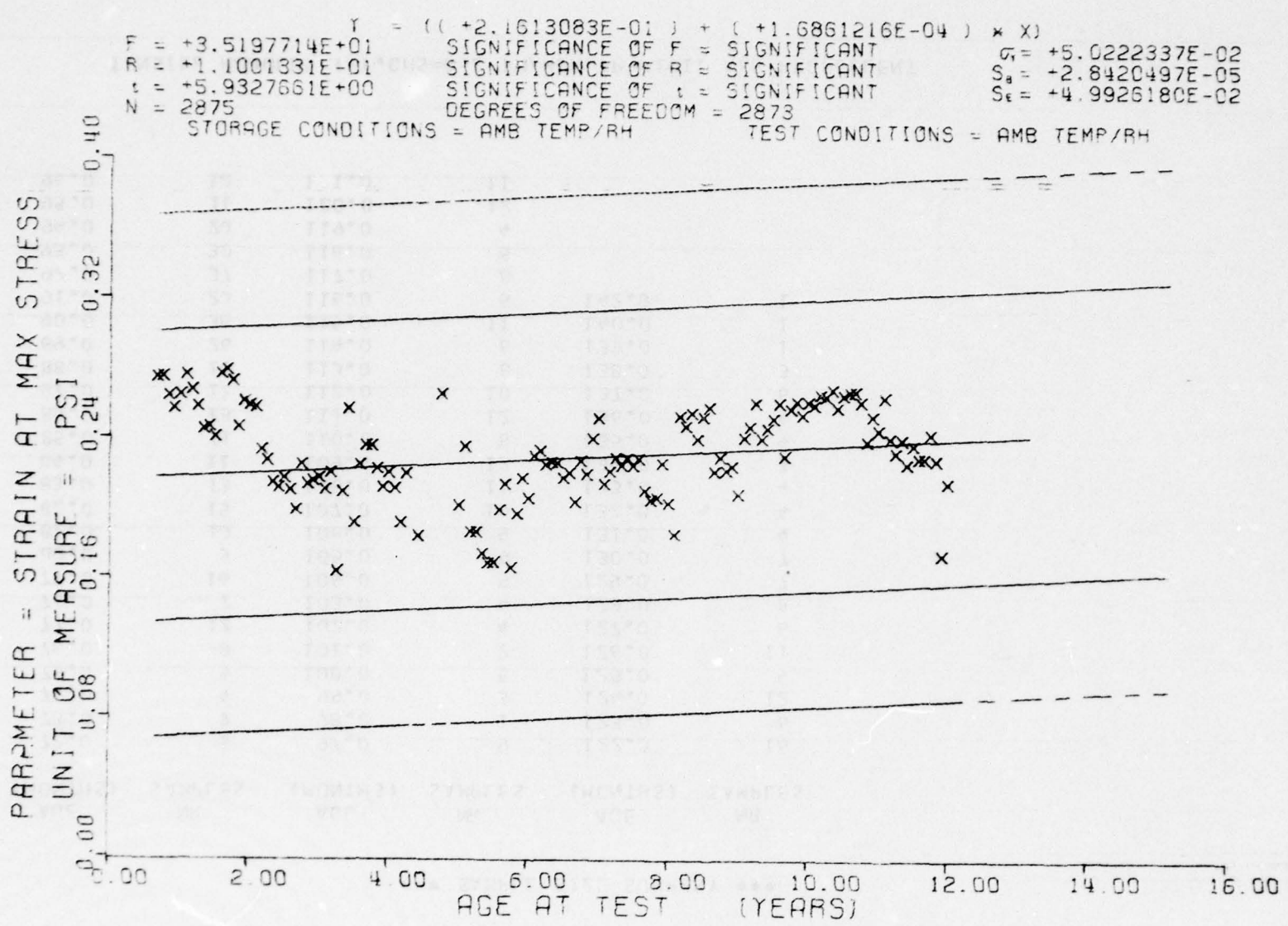

Y = ((+2.1613083E-01) + (+1.6861216E-04) × X)
F = +3.5197714E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +1.1001331E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +5.9327661E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 2875 DEGREES OF FREEDOM = 2873
σ_Y = +5.0222337E-02
S_a = +2.8420497E-05
S_ϵ = +4.9926180E-02
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.00
0.08
0.16
0.24
0.32
0.40
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE STRAIN AT MAX STRESS, CHS=1750.0 IN/MIN, TP-H1011 A4B PROPELLENT

Figure 16

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
8.0	4	33.0	23	64.0	13	89.0	75	114.0	26
9.0	2	34.0	11	65.0	6	90.0	85	115.0	13
10.0	4	35.0	14	66.0	12	91.0	66	116.0	35
11.0	3	36.0	18	67.0	9	92.0	96	117.0	25
12.0	4	37.0	9	68.0	12	93.0	49	118.0	25
13.0	6	38.0	2	69.0	15	94.0	60	119.0	41
14.0	2	39.0	4	70.0	14	95.0	42	120.0	42
15.0	8	40.0	6	71.0	21	96.0	30	121.0	13
16.0	7	41.0	5	72.0	21	97.0	26	122.0	36
17.0	7	42.0	14	73.0	24	98.0	24	123.0	24
18.0	10	43.0	34	74.0	12	99.0	20	124.0	9
19.0	10	44.0	31	75.0	15	100.0	15	125.0	24
20.0	4	45.0	31	76.0	9	101.0	18	126.0	18
21.0	6	46.0	32	77.0	45	102.0	18	127.0	29
22.0	19	47.0	30	78.0	18	103.0	20	128.0	9
23.0	16	48.0	6	79.0	36	104.0	42	129.0	18
24.0	20	49.0	10	80.0	27	105.0	27	130.0	9
25.0	15	50.0	6	81.0	21	106.0	33	131.0	12
26.0	20	51.0	7	82.0	63	107.0	18	132.0	24
27.0	24	53.0	2	83.0	24	108.0	18	133.0	15
28.0	15	57.0	1	84.0	39	109.0	23	134.0	14
29.0	12	58.0	2	85.0	22	110.0	30	135.0	30
30.0	22	61.0	3	86.0	18	111.0	52	136.0	31
31.0	15	62.0	9	87.0	69	112.0	20	137.0	12
32.0	21	63.0	14	88.0	101	113.0	48	138.0	17
								139.0	18
								140.0	12
								141.0	11
								142.0	8
								143.0	9
								144.0	12
								158.0	5

TENSILE STRAIN AT MAX STRESS, CIS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

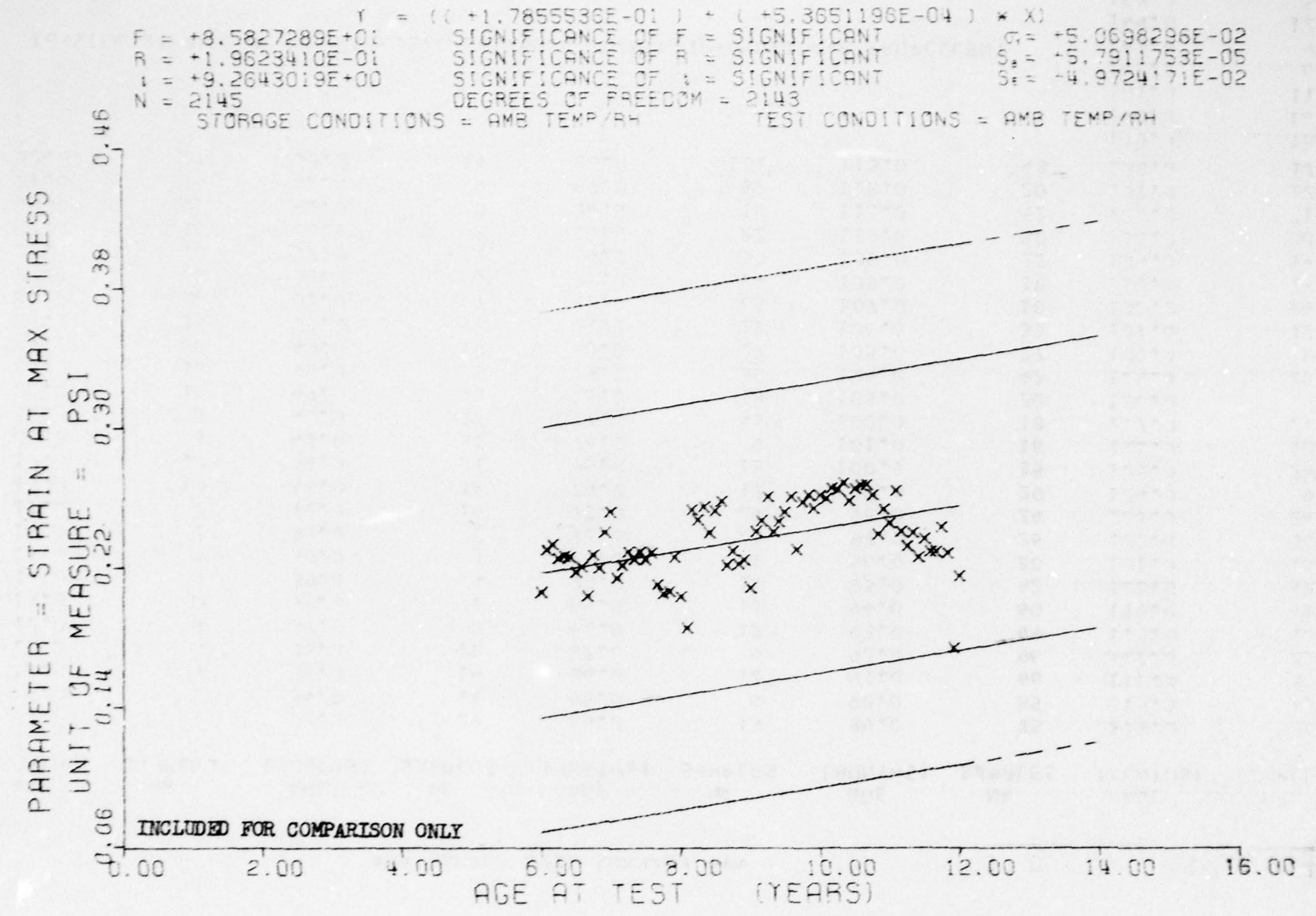

Y = ((+1.7855536E-01) + (+5.3651196E-04) * X)
F = +8.5827289E+01
SIGNIFICANCE OF F = SIGNIFICANT
σ = +5.0698296E-02
R = +1.9623410E-01
SIGNIFICANCE OF R = SIGNIFICANT
S_β = +5.7911753E-05
t = +9.2643019E+00
SIGNIFICANCE OF t = SIGNIFICANT
S_ε = +4.9724171E-02
N = 2145
DEGREES OF FREEDOM = 2143
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.06
0.14
0.22
0.30
0.38
0.46
INCLUDED FOR COMPARISON ONLY
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE STRAIN AT MAX STRESS, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 16A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	17
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TENSILE STRAIN AT MAX STRESS, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

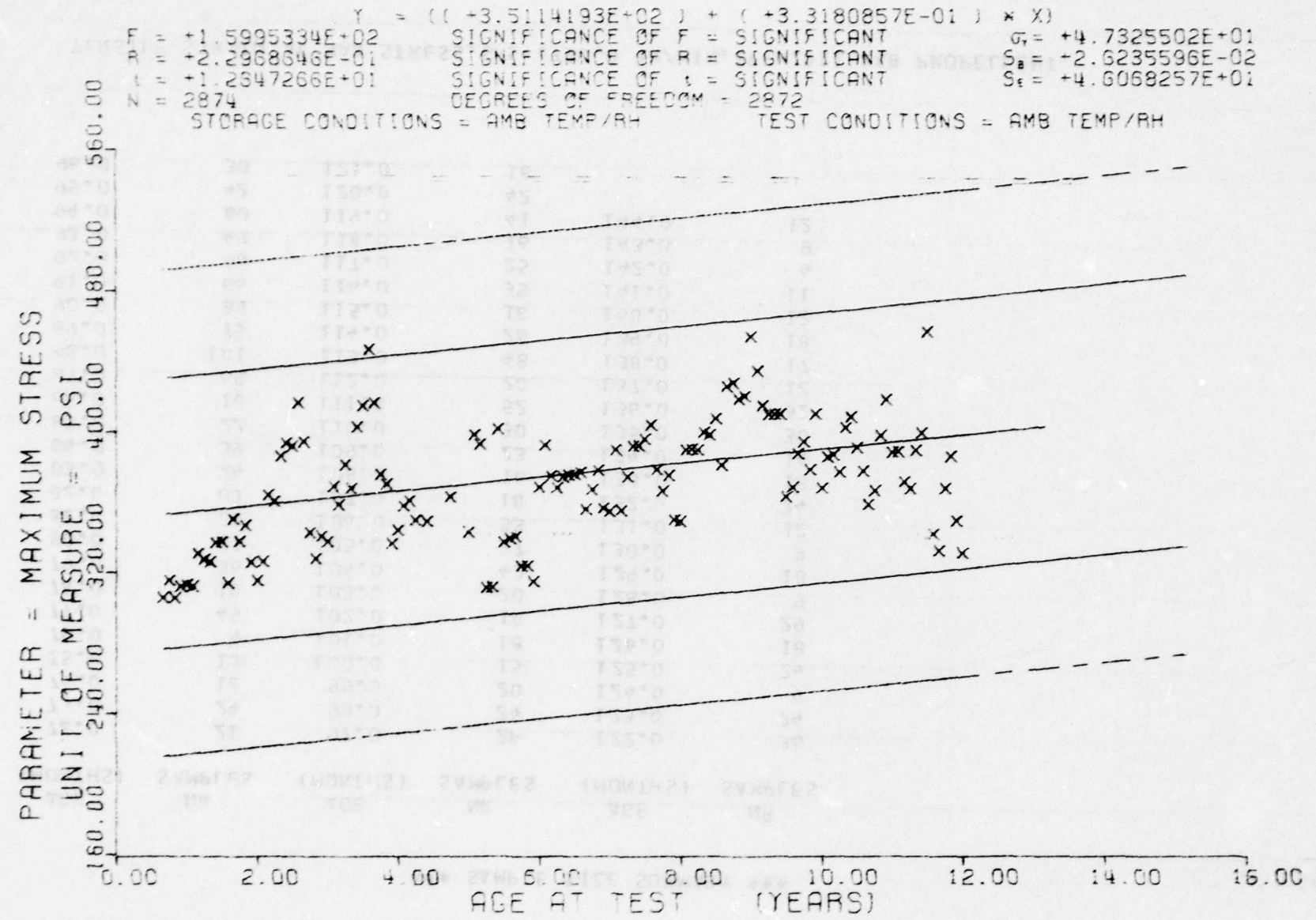

Y = ((+3.5114193E+02) + (+3.3180857E-01) * X)
F = +1.5995334E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +2.2968646E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +1.2647266E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 2874 DEGREES OF FREEDOM = 2872
σ_T = +4.7325502E+01
S_β = +2.6235596E-02
S_ε = +4.6068257E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
160.00
240.00
320.00
400.00
480.00
560.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE MAXIMUM STRESS,CHS=1750.0 IN/MIN,TP-H1011 A&B PROPELLENT

Figure 17

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
8.0	1	33.0	23	64.0	13	89.0	75	114.0	24
9.0	2	34.0	11	65.0	6	90.0	85	115.0	13
10.0	4	35.0	14	66.0	12	91.0	66	116.0	35
11.0	2	36.0	16	67.0	9	92.0	96	117.0	25
12.0	4	37.0	9	68.0	12	93.0	49	118.0	15
13.0	0	38.0	1	69.0	15	94.0	60	119.0	41
14.0	3	39.0	4	70.0	14	95.0	42	120.0	42
15.0	2	40.0	5	71.0	21	96.0	30	121.0	13
16.0	7	41.0	6	72.0	21	97.0	26	122.0	34
17.0	7	42.0	14	73.0	24	98.0	24	123.0	24
18.0	10	43.0	34	74.0	12	99.0	20	124.0	9
19.0	10	44.0	31	75.0	18	100.0	15	125.0	24
20.0	4	45.0	31	76.0	9	101.0	18	126.0	16
21.0	3	46.0	32	77.0	45	102.0	18	127.0	29
22.0	10	47.0	30	78.0	18	103.0	20	128.0	9
23.0	18	48.0	8	79.0	36	104.0	42	129.0	18
24.0	20	49.0	10	80.0	27	105.0	27	130.0	9
25.0	15	50.0	0	81.0	21	106.0	33	131.0	12
26.0	26	51.0	7	82.0	63	107.0	18	132.0	24
27.0	24	52.0	3	83.0	24	108.0	18	133.0	18
28.0	16	57.0	1	84.0	39	109.0	23	134.0	14
29.0	12	80.0	3	85.0	22	110.0	30	135.0	30
30.0	22	81.0	6	86.0	18	111.0	52	136.0	21
31.0	16	82.0	9	87.0	69	112.0	20	137.0	12
32.0	21	83.0	14	88.0	101	113.0	48	138.0	18
								139.0	18
								140.0	12
								141.0	11
								142.0	6
								143.0	9
								144.0	12
								150.0	5

TENSILE MAXIMUM STRESS, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

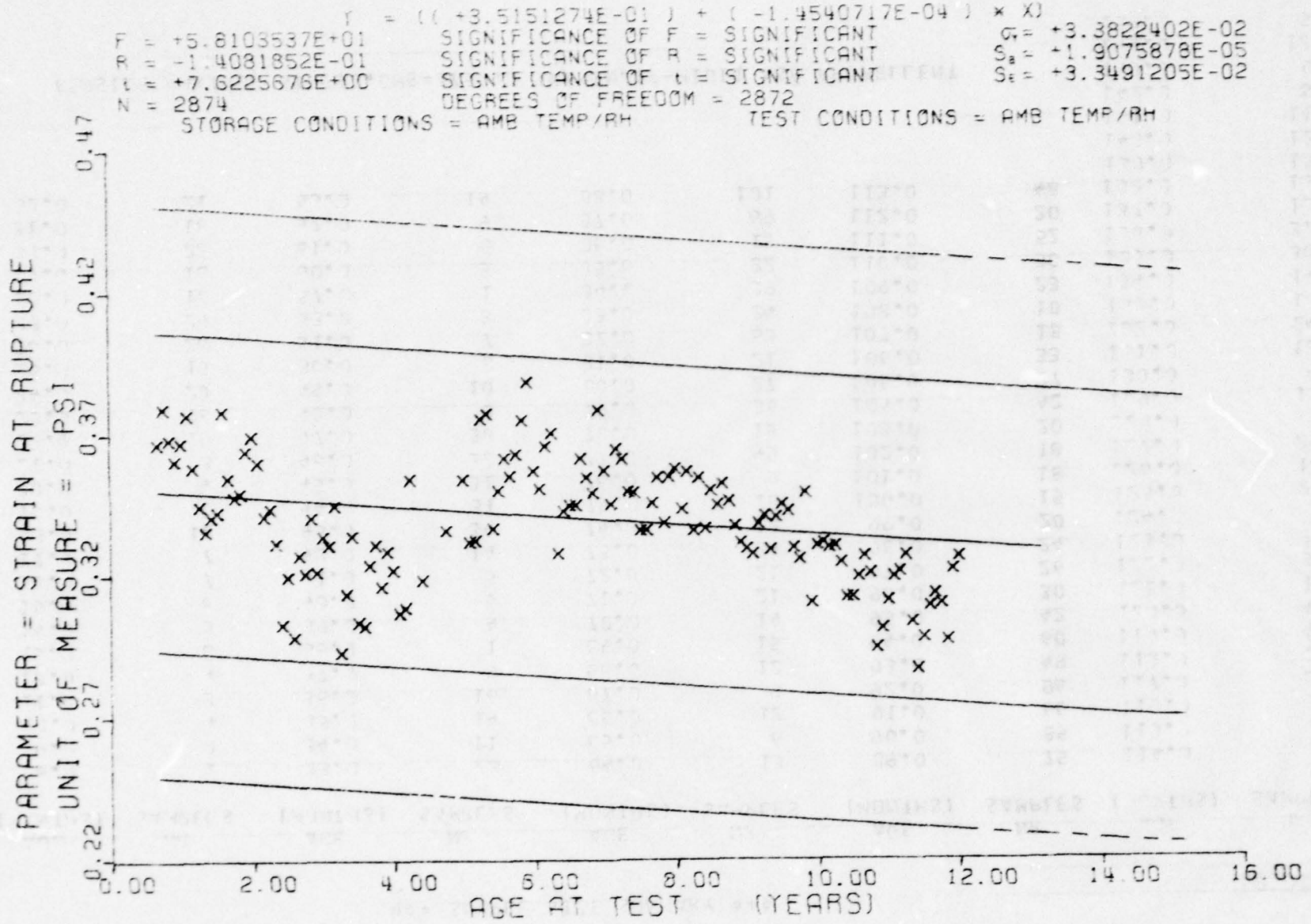
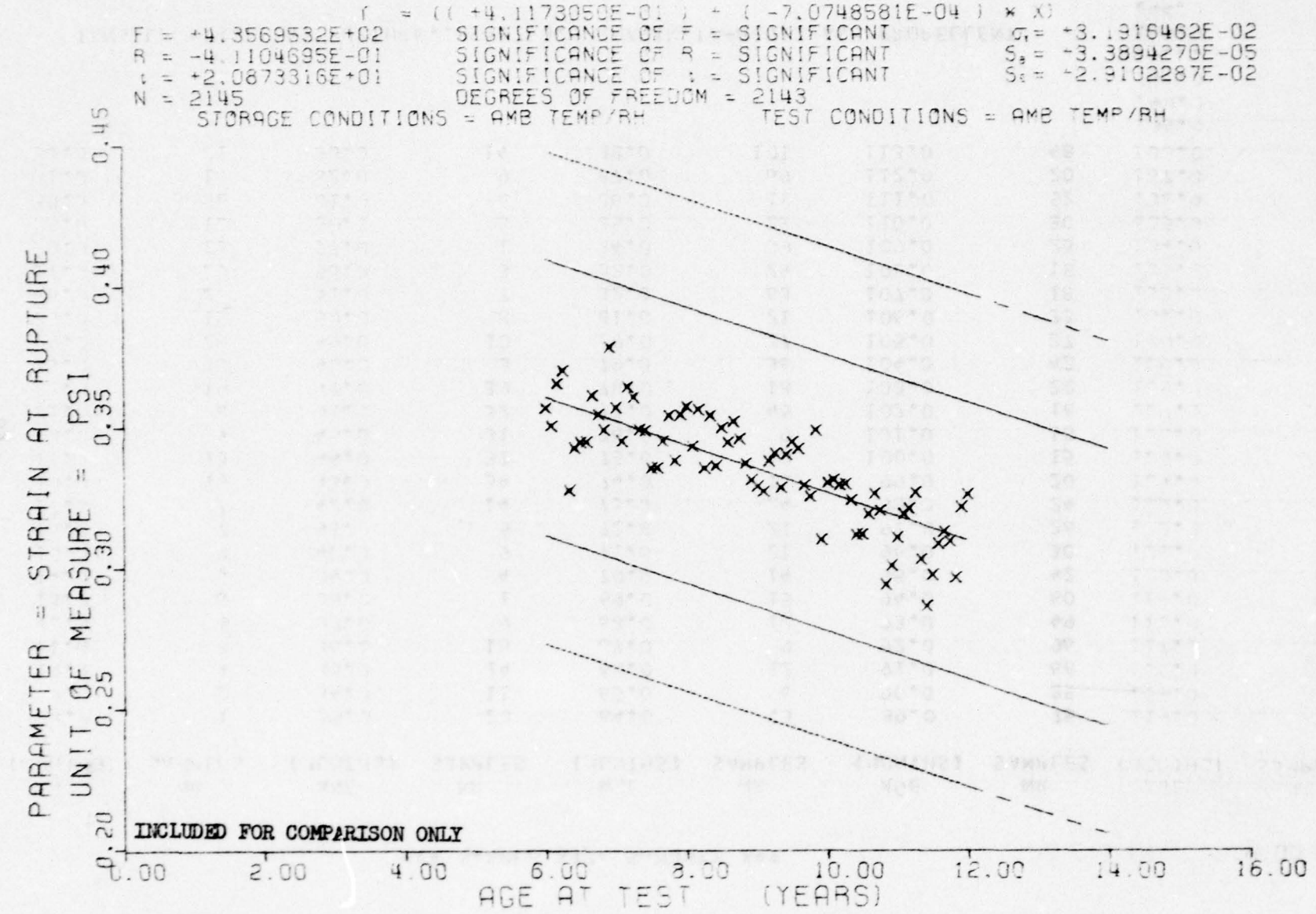

Y = ((+3.5151274E-01) + (-1.4540717E-04) * X)
F = +5.8103537E+01
R = -1.4081852E-01
t = +7.6225676E+00
N = 2874
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 2872
σ = +3.3822402E-02
Sa = +1.9075878E-05
Se = +3.3491205E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PSI
0.47
0.42
0.37
0.32
0.27
0.22
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE STRAIN AT RUPTURE, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 18

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLE
[illegible]	[illegible]	33.0	23	64.0	13	89.0	75	114.0	26
[illegible]	[illegible]	34.0	11	65.0	6	90.0	85	[illegible]	18
17.0	[illegible]	35.0	14	66.0	12	91.0	66	[illegible]	35
11.0	[illegible]	36.0	16	67.0	9	92.0	96	[illegible]	25
[illegible]	[illegible]	37.0	9	68.0	12	93.0	49	[illegible]	16
13.0	[illegible]	38.0	[illegible]	69.0	15	94.0	60	[illegible]	41
[illegible]	[illegible]	39.0	4	70.0	14	95.0	42	[illegible]	42
[illegible]	[illegible]	40.0	[illegible]	71.0	21	96.0	30	[illegible]	[illegible]
[illegible]	[illegible]	41.0	[illegible]	72.0	21	97.0	26	[illegible]	[illegible]
[illegible]	[illegible]	42.0	14	[illegible]	24	98.0	24	[illegible]	24
[illegible]	[illegible]	43.0	34	74.0	[illegible]	99.0	20	[illegible]	[illegible]
[illegible]	[illegible]	44.0	31	75.0	[illegible]	100.0	15	[illegible]	[illegible]
[illegible]	[illegible]	45.0	31	76.0	9	101.0	18	[illegible]	[illegible]
21.0	[illegible]	[illegible]	32	77.0	45	102.0	18	[illegible]	[illegible]
22.0	[illegible]	47.0	30	78.0	18	103.0	20	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	79.0	[illegible]	104.0	42	[illegible]	[illegible]
24.0	[illegible]	49.0	[illegible]	80.0	27	105.0	27	[illegible]	[illegible]
[illegible]	[illegible]	50.0	[illegible]	81.0	21	106.0	33	[illegible]	[illegible]
26.0	[illegible]	51.0	[illegible]	82.0	[illegible]	107.0	18	[illegible]	[illegible]
[illegible]	[illegible]	53.0	[illegible]	83.0	24	108.0	18	[illegible]	[illegible]
[illegible]	[illegible]	57.0	[illegible]	84.0	[illegible]	109.0	23	[illegible]	[illegible]
[illegible]	[illegible]	60.0	[illegible]	85.0	22	110.0	30	[illegible]	[illegible]
30.0	[illegible]	61.0	[illegible]	86.0	[illegible]	111.0	52	[illegible]	[illegible]
[illegible]	[illegible]	62.0	[illegible]	87.0	[illegible]	112.0	20	[illegible]	[illegible]
[illegible]	[illegible]	63.0	[illegible]	88.0	[illegible]	113.0	48	[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]
								[illegible]	[illegible]

TENSILE STRAIN AT RUPTURE, CPS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT



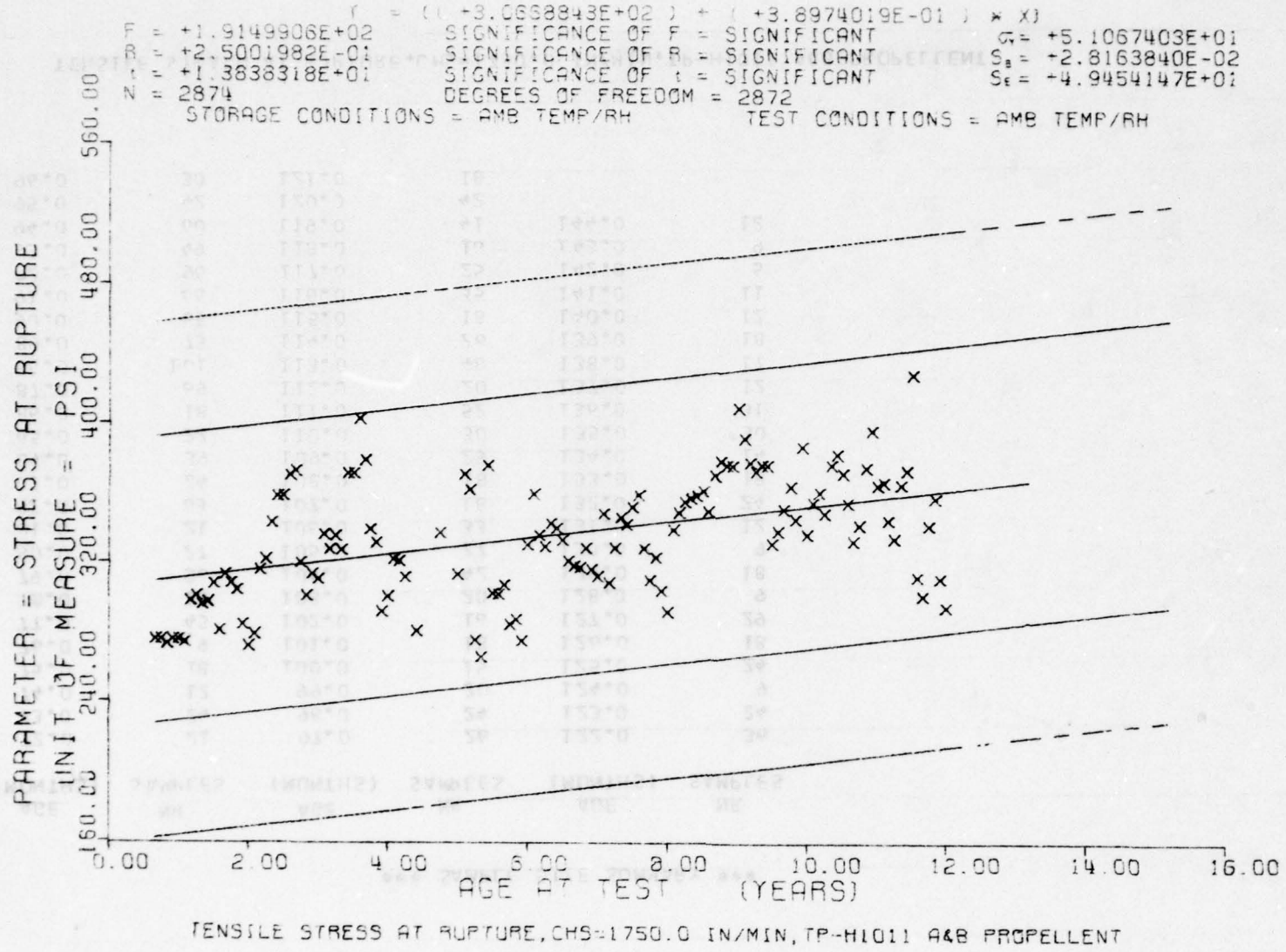
TENSILE STRAIN AT RUPTURE, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 18A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	17
89.0	75	114.0	26	139.0	18
90.0	65	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TENSILE STRAIN AT RUPTURE,CHS=1750.0 IN/MIN,TP-H1011 A&B PROPELLENT



TENSILE STRESS AT RUPTURE, CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

Figure 19

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	1	33.0	23	64.0	13	89.0	75	114.0	26
[illegible]	2	34.0	11	65.0	6	90.0	85	115.0	10
35.0	4	35.0	14	66.0	12	91.0	66	116.0	33
36.0	3	36.0	10	67.0	9	92.0	96	117.0	25
37.0	4	37.0	9	68.0	12	93.0	49	118.0	16
38.0	6	38.0	1	69.0	15	94.0	60	119.0	41
39.0	3	39.0	4	70.0	14	95.0	42	120.0	42
40.0	6	40.0	5	71.0	21	96.0	30	121.0	18
41.0	7	41.0	5	72.0	21	97.0	26	122.0	30
42.0	7	42.0	14	73.0	24	98.0	24	123.0	24
43.0	10	43.0	34	74.0	12	99.0	20	124.0	9
44.0	10	44.0	21	75.0	18	100.0	15	125.0	24
45.0	4	45.0	21	76.0	9	101.0	18	126.0	10
46.0	3	46.0	32	77.0	45	102.0	18	127.0	25
47.0	10	47.0	30	78.0	18	103.0	20	128.0	9
48.0	10	48.0	8	79.0	38	104.0	42	129.0	10
49.0	20	49.0	10	80.0	27	105.0	27	130.0	9
50.0	15	50.0	8	81.0	21	106.0	33	131.0	12
51.0	20	51.0	7	82.0	63	107.0	18	132.0	24
52.0	24	52.0	3	83.0	24	108.0	18	133.0	10
53.0	16	53.0	1	84.0	39	109.0	25	134.0	14
54.0	12	58.0	3	85.0	22	110.0	30	135.0	20
55.0	22	61.0	6	86.0	18	111.0	52	136.0	31
61.0	10	62.0	9	87.0	69	112.0	20	137.0	12
62.0	24	63.0	14	88.0	101	113.0	48	138.0	10
								139.0	18
								140.0	12
								141.0	11
								142.0	6
								143.0	9
								144.0	12
								150.0	5

TENSILE STRESS AT RUPTURE,CRS=1750.0 IN/MIN,TP-H1011 A&B PROPELLENT

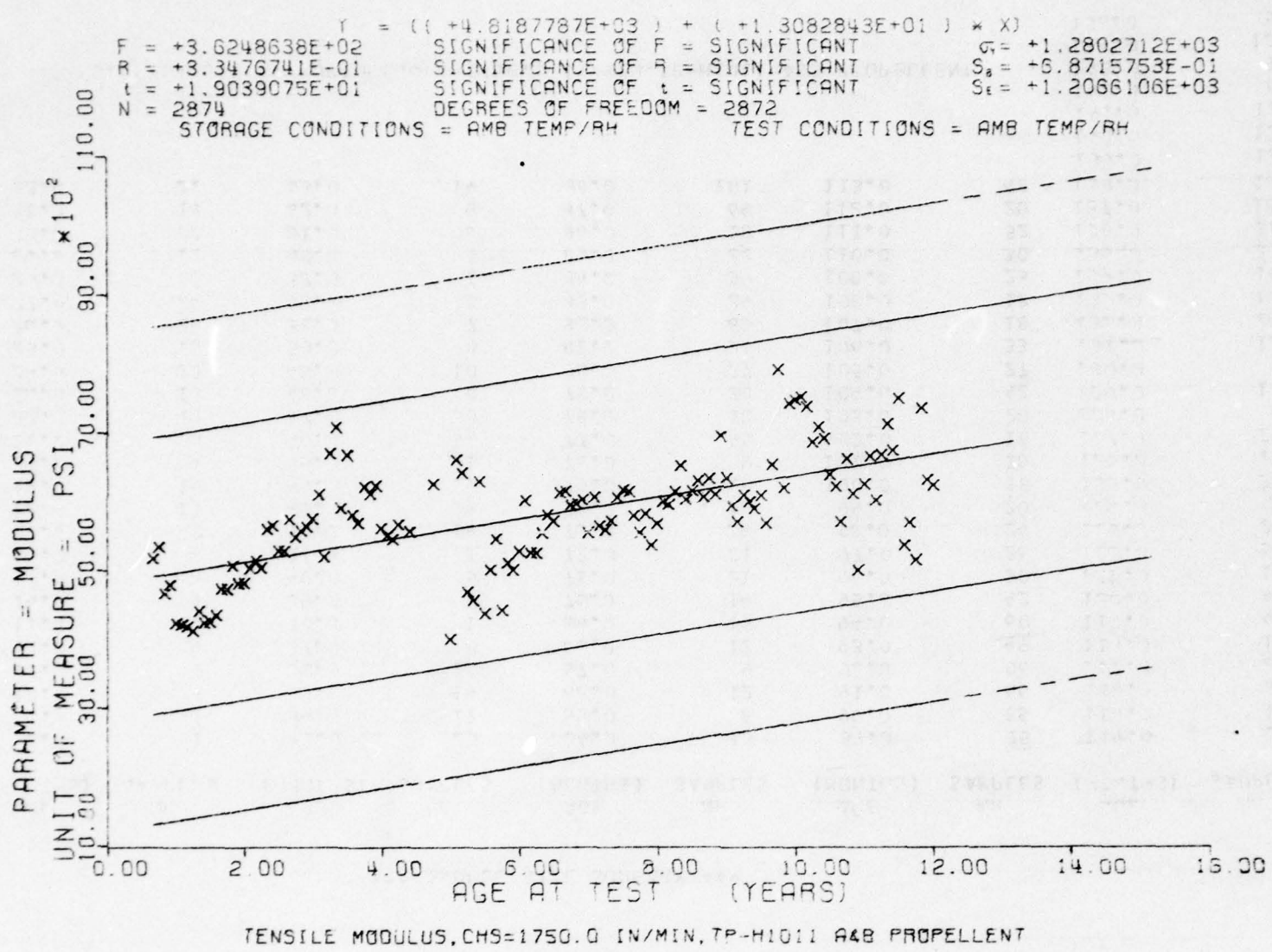

Y = ((+4.8187787E+03) + (+1.3082843E+01) * X)
F = +3.6248638E+02
R = +3.3476741E-01
t = +1.9039075E+01
N = 2874
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 2872
σ_Y = +1.2802712E+03
S_β = +6.8715753E-01
S_t = +1.2066106E+03
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
×10²
10.00
30.00
50.00
70.00
90.00
110.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TENSILE MODULUS, CHS=1750.0 IN/MIN, TP-H1011 A4B PROPELLENT

Figure 20

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
8.0	1	33.0	23	64.0	13	89.0	75	114.0	26
9.0	2	34.0	11	65.0	6	90.0	85	115.0	17
10.0	1	35.0	14	66.0	12	91.0	66	116.0	35
11.0	3	36.0	10	67.0	9	92.0	96	117.0	23
12.0	4	37.0	9	68.0	12	93.0	49	118.0	10
13.0	6	38.0	1	69.0	15	94.0	60	119.0	41
14.0	5	39.0	4	70.0	14	95.0	42	120.0	42
15.0	6	40.0	5	71.0	21	96.0	30	121.0	10
16.0	7	41.0	5	72.0	21	97.0	26	122.0	36
17.0	7	42.0	14	73.0	24	98.0	24	123.0	24
18.0	10	43.0	34	74.0	12	99.0	20	124.0	9
19.0	10	44.0	31	75.0	16	100.0	15	125.0	24
20.0	4	45.0	31	76.0	9	101.0	18	126.0	18
21.0	8	46.0	32	77.0	45	102.0	18	127.0	29
22.0	12	47.0	30	78.0	18	103.0	20	128.0	5
23.0	16	48.0	2	79.0	36	104.0	42	129.0	12
24.0	20	49.0	10	80.0	27	105.0	27	130.0	9
25.0	15	50.0	8	81.0	21	106.0	33	131.0	12
26.0	26	51.0	7	82.0	63	107.0	18	132.0	24
27.0	24	53.0	5	83.0	24	108.0	18	133.0	16
28.0	16	57.0	1	84.0	39	109.0	23	134.0	14
29.0	12	60.0	3	85.0	22	110.0	30	135.0	30
30.0	22	61.0	8	86.0	18	111.0	52	136.0	31
31.0	16	62.0	9	87.0	69	112.0	20	137.0	12
32.0	21	63.0	14	88.0	101	113.0	48	138.0	16
								139.0	13
								140.0	12
								141.0	11
								142.0	6
								143.0	9
								144.0	12
								152.0	5

TENSILE MODULUS,CHS=175C.0 IN/MIN,TP-H1011 A&B PROPELLENT

TRIAXIAL TENSILE, STRAIN AT MAX STRESS, CHS-1750 IN/MIN AT 600 PSI, TP-HIGH 94B

Figure 21

PARAMETER = STRAIN AT MAX STRESS

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
24.0	1	60.0	3	87.0	14	112.0	14	137.0	1
25.0	1	63.0	4	88.0	21	113.0	7	138.0	3
26.0	2	64.0	4	89.0	25	114.0	5	139.0	3
31.0	1	65.0	3	90.0	23	115.0	6	141.0	2
32.0	1	66.0	3	91.0	13	116.0	9	143.0	2
33.0	2	67.0	2	92.0	5	117.0	8	144.0	5
34.0	2	68.0	2	93.0	6	118.0	7	145.0	1
35.0	1	69.0	2	94.0	8	119.0	9	147.0	2
36.0	3	70.0	3	95.0	7	120.0	11	149.0	1
37.0	2	71.0	8	96.0	7	121.0	8	150.0	1
39.0	2	72.0	9	97.0	3	122.0	10		
40.0	1	73.0	4	98.0	12	123.0	6		
41.0	5	74.0	7	99.0	10	124.0	9		
42.0	2	75.0	17	100.0	10	125.0	15		
43.0	5	76.0	5	101.0	8	126.0	2		
44.0	15	77.0	9	102.0	10	127.0	7		
45.0	29	78.0	10	103.0	5	128.0	7		
46.0	25	79.0	5	104.0	7	129.0	8		
47.0	35	80.0	11	105.0	7	130.0	5		
48.0	7	81.0	4	106.0	12	131.0	2		
49.0	12	82.0	13	107.0	13	132.0	6		
50.0	4	83.0	7	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
53.0	2	85.0	15	110.0	12	135.0	2		
59.0	1	86.0	5	111.0	7	136.0	2		

TRIAXIAL TENSILE STRAIN AT MAX STRESS,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

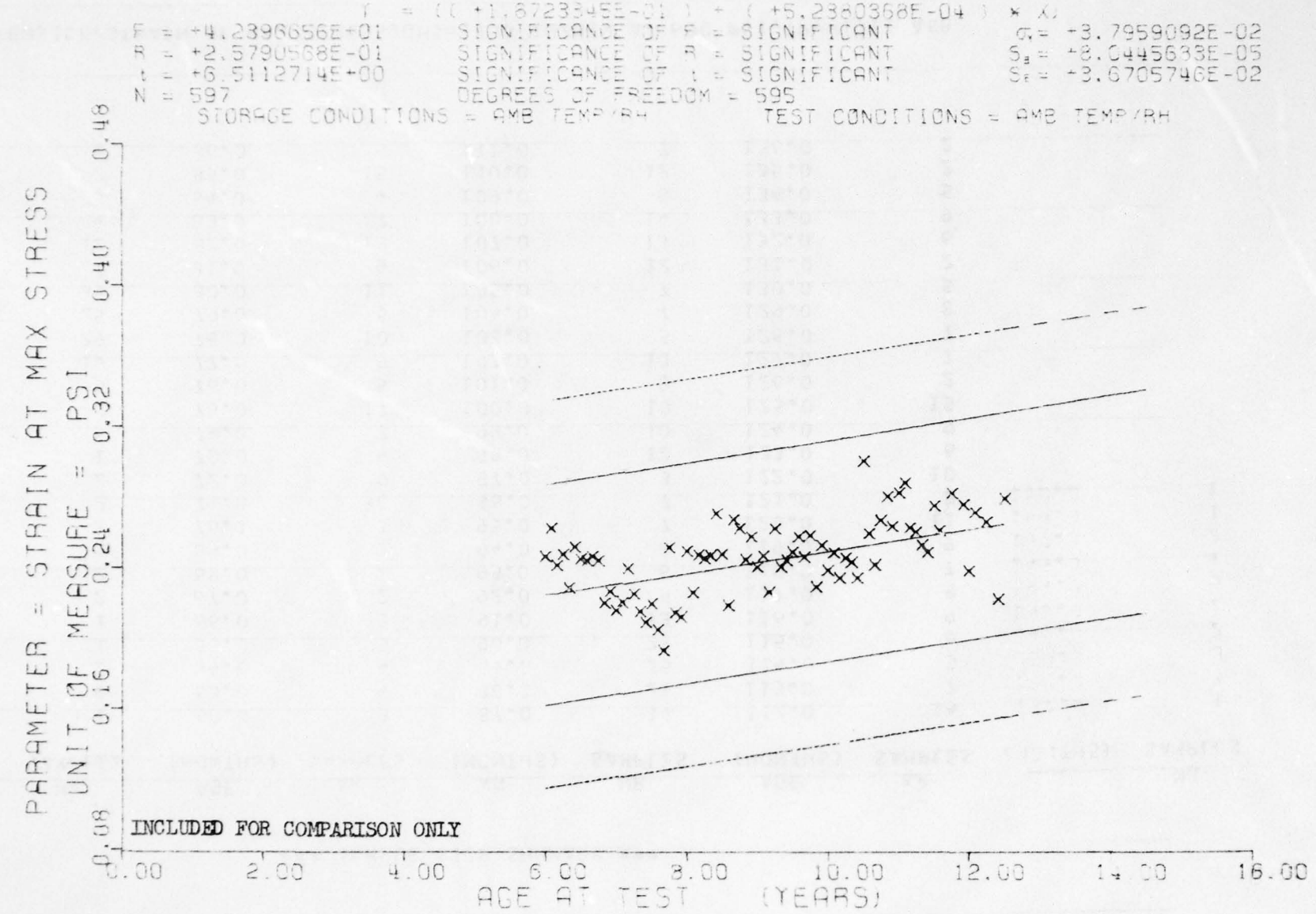

Y = ((+1.6723345E-01) + (+5.2380368E-04) * X)
F = +4.2396656E+01
R = +2.5790568E-01
t = +6.5112714E+00
N = 597
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 595
σ = +3.7959092E-02
Sa = +8.0445633E-05
Sε = +3.6705746E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = PSI
0.08
0.16
0.24
0.32
0.40
0.48
INCLUDED FOR COMPARISON ONLY
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS-1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Figure 21A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	3	122.0	10
73.0	4	98.0	12	123.0	6
74.0	7	99.0	10	124.0	9
75.0	17	100.0	10	125.0	15
76.0	5	101.0	8	126.0	2
77.0	9	102.0	10	127.0	7
78.0	10	103.0	5	128.0	7
79.0	5	104.0	7	129.0	8
80.0	11	105.0	7	130.0	5
81.0	4	106.0	12	131.0	2
82.0	13	107.0	13	132.0	6
83.0	7	108.0	14	133.0	9
84.0	4	109.0	8	134.0	5
85.0	15	110.0	12	135.0	2
86.0	5	111.0	7	136.0	2
87.0	14	112.0	14	137.0	1
88.0	21	113.0	7	138.0	3
89.0	25	114.0	5	139.0	3
90.0	28	115.0	6	141.0	2
91.0	13	116.0	9	143.0	2
92.0	5	117.0	8	144.0	5
93.0	6	118.0	7	145.0	1
94.0	8	119.0	9	147.0	2
95.0	7	120.0	11	149.0	1
96.0	7	121.0	8	150.0	1

TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

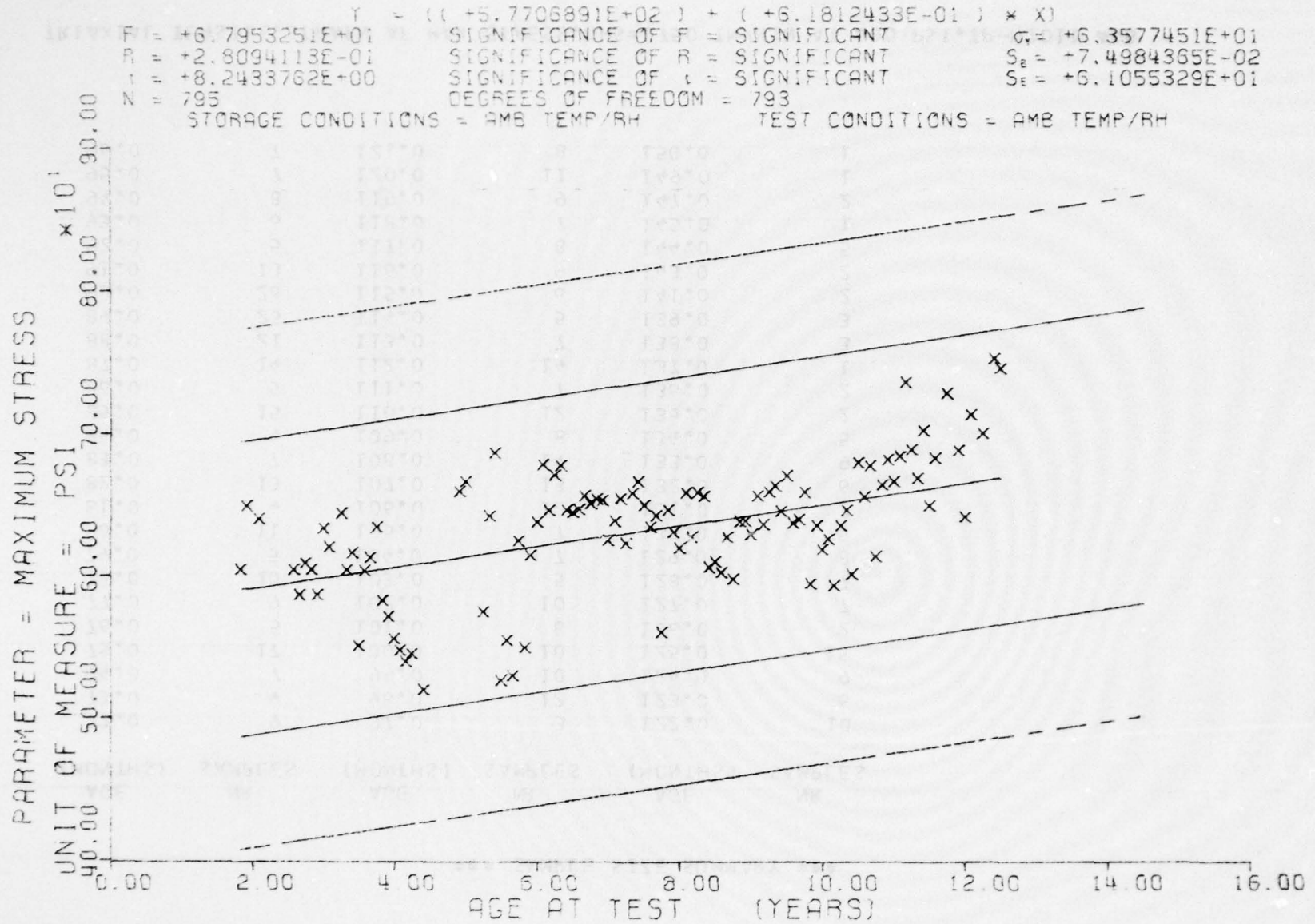

Y = ((+5.7706891E+02) + (+6.1812433E-01) × X)
F = +6.7953251E+01
R = +2.8094113E-01
t = +8.2433762E+00
N = 795
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 793
σt = +6.3577451E+01
Sε = +7.4984365E-02
Sε = +6.1055329E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
×10¹
90.00
80.00
70.00
60.00
50.00
40.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE, MAXIMUM STRESS, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 9&B

Figure 22

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
[illegible]	1	[illegible]	3	37.0	14	112.0	14	[illegible]	1
[illegible]	1	[illegible]	4	38.0	21	113.0	7	[illegible]	[illegible]
[illegible]	2	[illegible]	4	39.0	25	114.0	5	[illegible]	[illegible]
31.0	1	[illegible]	3	90.0	28	115.0	6	[illegible]	[illegible]
[illegible]	1	[illegible]	3	91.0	13	116.0	9	[illegible]	[illegible]
[illegible]	2	57.0	2	92.0	5	117.0	8	[illegible]	[illegible]
34.0	2	58.0	2	93.0	6	118.0	7	[illegible]	1
[illegible]	1	59.0	2	94.0	3	119.0	9	[illegible]	[illegible]
36.0	3	70.0	3	95.0	7	120.0	11	[illegible]	1
37.0	2	71.0	3	96.0	7	121.0	8	[illegible]	[illegible]
[illegible]	2	72.0	9	97.0	3	122.0	10		
40.0	1	73.0	4	98.0	12	123.0	6		
41.0	3	74.0	7	99.0	10	124.0	9		
42.0	2	75.0	17	100.0	10	125.0	15		
43.0	3	76.0	5	101.0	8	126.0	2		
44.0	13	77.0	9	102.0	10	127.0	7		
45.0	25	78.0	10	103.0	5	128.0	7		
[illegible]	25	79.0	5	104.0	7	129.0	8		
47.0	33	80.0	11	105.0	7	130.0	5		
[illegible]	7	81.0	4	106.0	12	131.0	2		
[illegible]	12	82.0	13	107.0	15	132.0	6		
[illegible]	9	83.0	7	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
[illegible]	2	85.0	15	110.0	12	135.0	2		
[illegible]	1	86.0	5	111.0	7	136.0	2		

T.I.AXIAL TENSILE,MAXIMUM STRESS,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

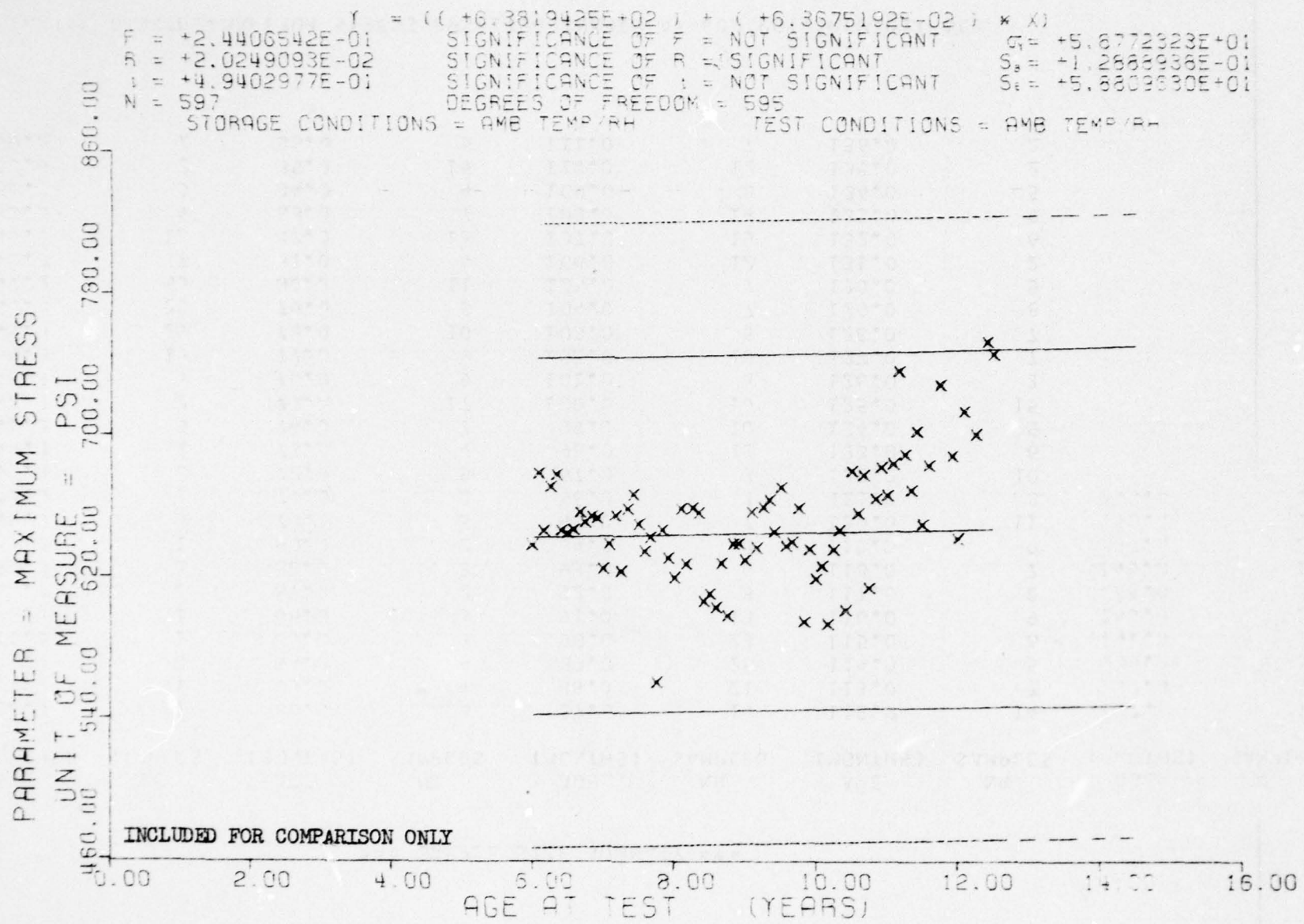

Y = ((+6.3819425E+02) + (+6.3675192E-02) * X)
F = +2.4406542E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = +2.0249093E-02 SIGNIFICANCE OF R = SIGNIFICANT
t = +4.9402977E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 597 DEGREES OF FREEDOM = 595
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
460.00
540.00
620.00
700.00
780.00
860.00
INCLUDED FOR COMPARISON ONLY
0.00
2.00
4.00
6.00
8.00
10.00
12.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE, MAXIMUM STRESS, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 448

Figure 22A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	9	97.0	3	122.0	10
73.0	4	98.0	12	123.0	6
74.0	7	99.0	10	124.0	9
75.0	17	100.0	10	125.0	15
76.0	5	101.0	8	126.0	2
77.0	9	102.0	10	127.0	7
78.0	10	103.0	5	128.0	7
79.0	5	104.0	7	129.0	8
80.0	11	105.0	7	130.0	5
81.0	4	106.0	12	131.0	2
82.0	13	107.0	13	132.0	6
83.0	7	108.0	14	133.0	9
84.0	4	109.0	8	134.0	5
85.0	15	110.0	12	135.0	2
86.0	5	111.0	7	136.0	2
87.0	14	112.0	14	137.0	1
88.0	21	113.0	7	138.0	3
89.0	25	114.0	5	139.0	3
90.0	23	115.0	6	141.0	2
91.0	13	116.0	9	143.0	2
92.0	5	117.0	8	144.0	5
93.0	6	118.0	7	145.0	1
94.0	3	119.0	9	147.0	2
95.0	7	120.0	11	149.0	1
96.0	7	121.0	8	150.0	1

TRIAXIAL TENSILE,MAXIMUM STRESS,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Y = (+2.9929229E-01) + (-1.8633335E-04) * X)

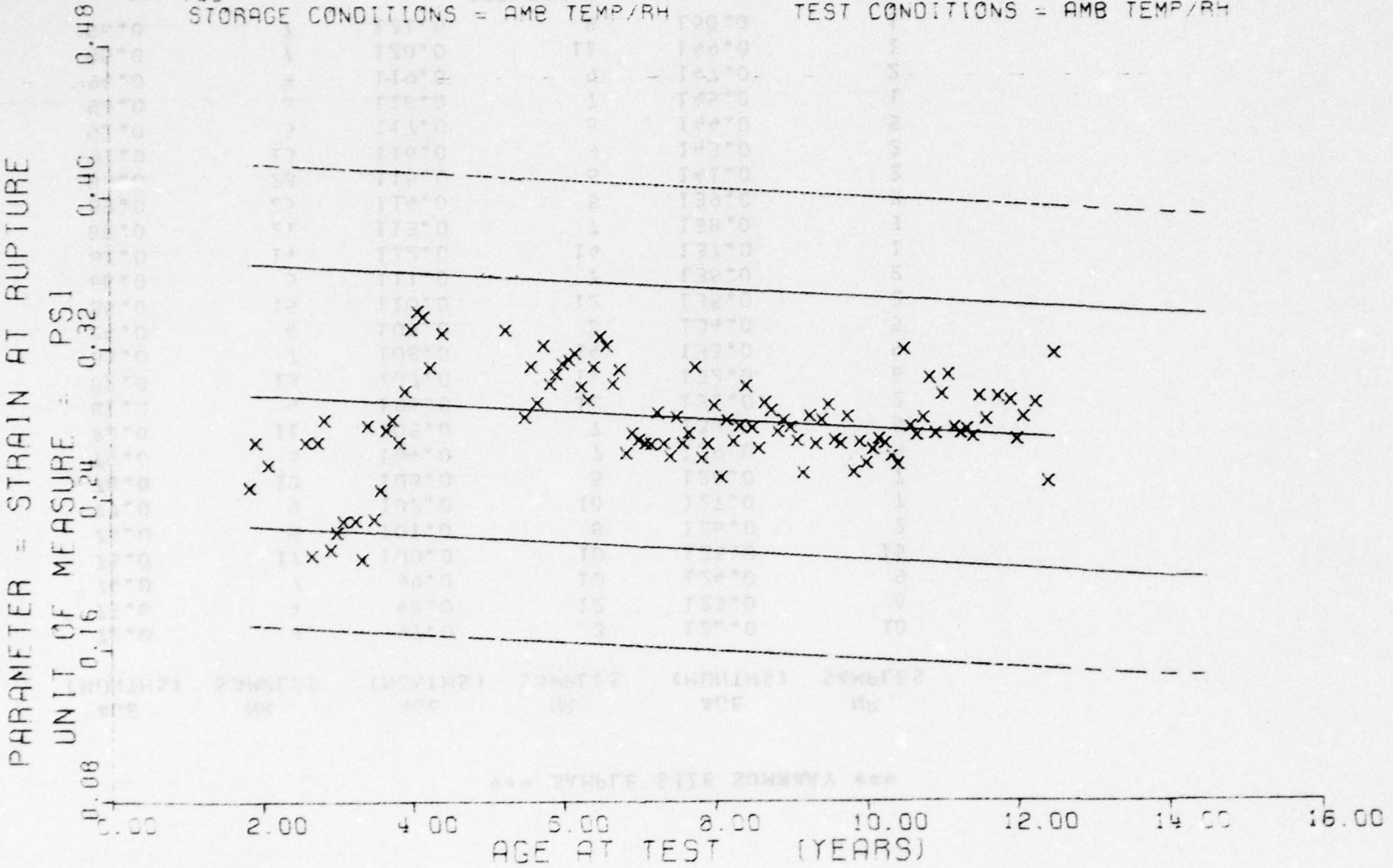
F = +1.3937382E+01 SIGNIFICANCE OF F = SIGNIFICANT σ_r = +4.0969675E-02

R = -1.3142279E-01 SIGNIFICANCE OF R = SIGNIFICANT S_a = +4.9911428E-05

t = +3.7332803E+00 SIGNIFICANCE OF t = SIGNIFICANT S_ε = +4.0639921E-02

N = 795 DEGREES OF FREEDOM = 793

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



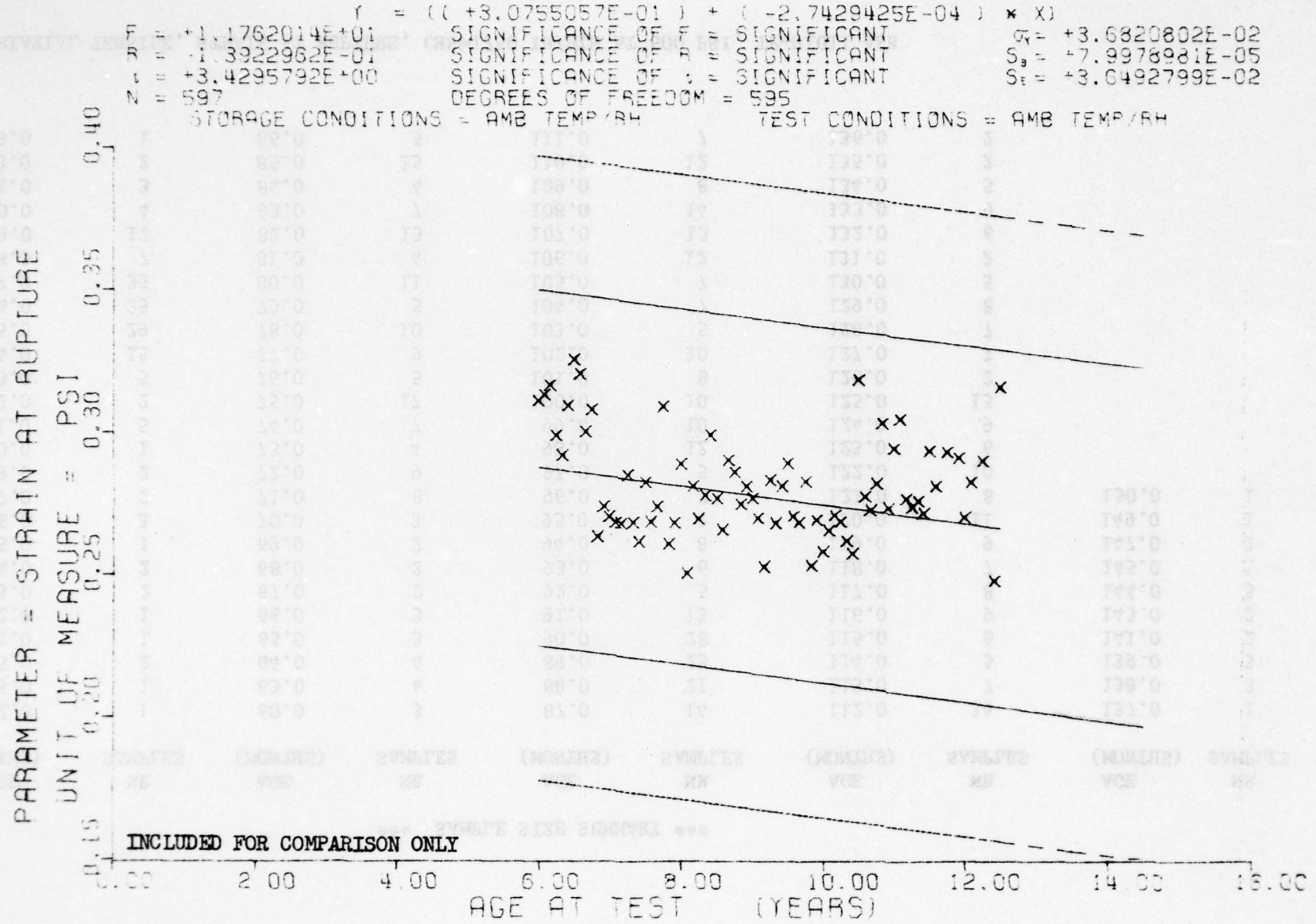
TRIAXIAL TENSILE, STRAIN AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B

Figure 23

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
22.0	1	60.0	3	87.0	14	112.0	14	137.0	1
23.0	1	63.0	4	88.0	21	113.0	7	138.0	3
25.0	2	64.0	4	89.0	25	114.0	5	139.0	3
31.0	1	65.0	3	90.0	28	115.0	6	141.0	2
32.0	1	66.0	3	91.0	13	116.0	9	143.0	2
33.0	2	67.0	2	92.0	5	117.0	8	144.0	5
34.0	2	68.0	2	93.0	6	118.0	7	145.0	1
35.0	1	69.0	2	94.0	8	119.0	9	147.0	2
36.0	3	70.0	3	95.0	7	120.0	11	149.0	1
37.0	2	71.0	8	96.0	7	121.0	8	150.0	1
39.0	2	72.0	9	97.0	3	122.0	10		
40.0	1	73.0	4	98.0	12	123.0	6		
41.0	5	74.0	7	99.0	10	124.0	9		
42.0	2	75.0	17	100.0	10	125.0	15		
43.0	5	76.0	5	101.0	8	126.0	2		
44.0	15	77.0	9	102.0	10	127.0	7		
45.0	29	78.0	10	103.0	5	128.0	7		
46.0	25	79.0	5	104.0	7	129.0	8		
47.0	35	80.0	11	105.0	7	130.0	5		
48.0	7	81.0	4	106.0	12	131.0	2		
49.0	12	82.0	13	107.0	13	132.0	6		
50.0	4	83.0	7	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
53.0	2	85.0	15	110.0	12	135.0	2		
59.0	1	86.0	5	111.0	7	136.0	2		

TRIAXIAL TENSILE, STRAIN AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B



TRIAXIAL TENSILE,STRAIN AT RUPTURE,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Figure 23A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	18	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	16
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TRIAXIAL TENSILE STRAIN AT RUPTURE ,CHS=1750.0 IN/MIN, TP-H1011 A&B PROPELLENT

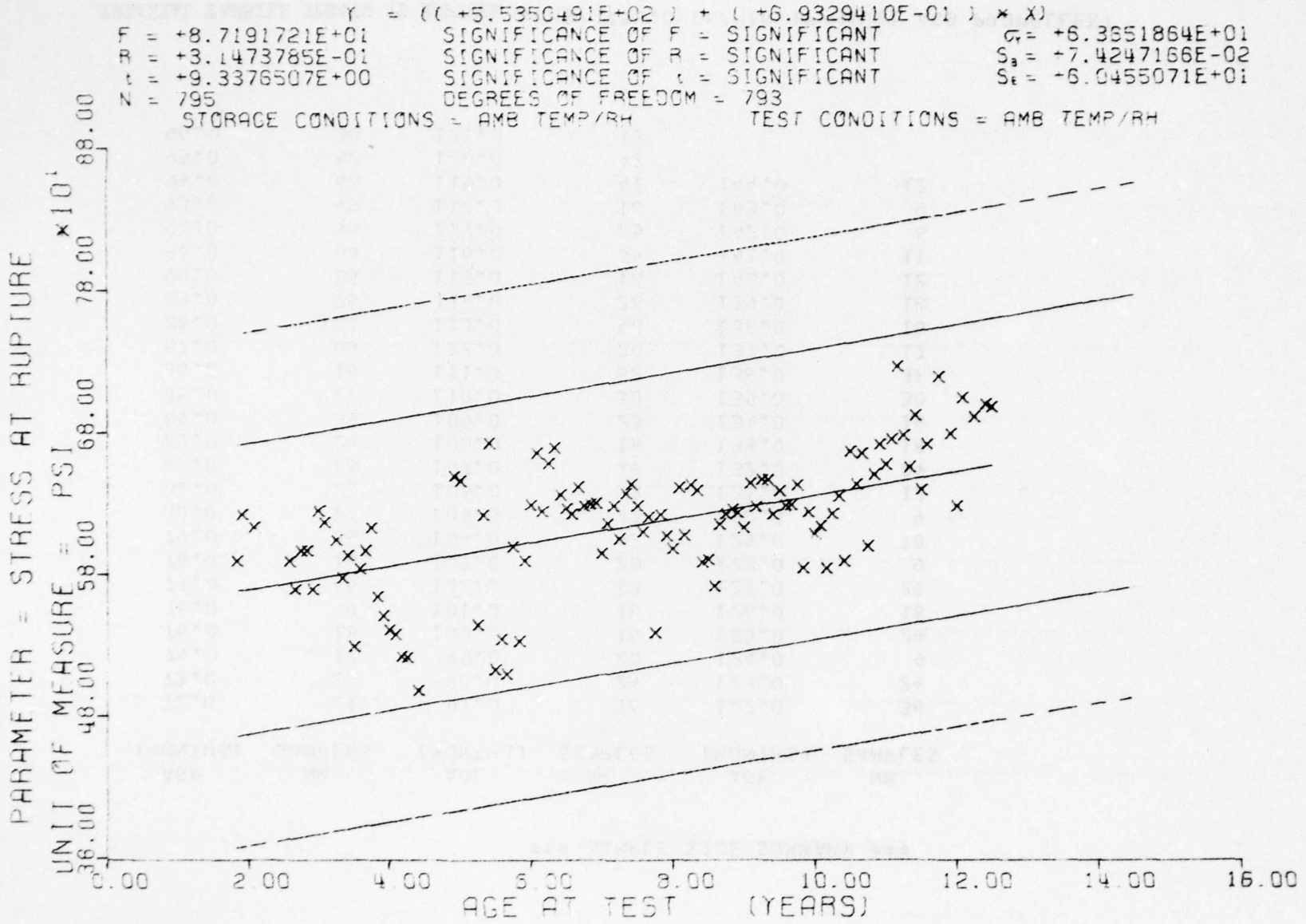

Y = ((+5.5350491E+02) + (+6.9329410E-01) * X)
F = +8.7191721E+01
R = +3.1473785E-01
t = +9.3376507E+00
N = 795
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 793
σr = +6.3851864E+01
Sa = +7.4247166E-02
Sε = +6.0455071E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
×10¹
88.00
78.00
68.00
58.00
48.00
38.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE,STRESS AT RUPTURE,CHS-1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Figure 24

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
22.0	1	60.0	3	87.0	14	112.0	14	137.0	1
23.0	1	63.0	4	88.0	21	113.0	7	138.0	3
25.0	2	64.0	4	89.0	25	114.0	5	139.0	3
31.0	1	65.0	3	90.0	28	115.0	6	141.0	2
32.0	1	66.0	3	91.0	13	116.0	9	143.0	2
33.0	2	67.0	2	92.0	5	117.0	8	144.0	5
34.0	2	68.0	2	93.0	6	118.0	7	145.0	1
35.0	1	69.0	2	94.0	8	119.0	9	147.0	2
36.0	3	70.0	3	95.0	7	120.0	11	149.0	1
37.0	2	71.0	8	96.0	7	121.0	8	150.0	1
39.0	2	72.0	9	97.0	3	122.0	10		
40.0	1	73.0	4	98.0	12	123.0	6		
41.0	5	74.0	7	99.0	10	124.0	9		
42.0	2	75.0	17	100.0	10	125.0	15		
43.0	5	76.0	5	101.0	8	126.0	2		
44.0	15	77.0	9	102.0	10	127.0	7		
45.0	29	78.0	10	103.0	5	128.0	7		
46.0	25	79.0	5	104.0	7	129.0	8		
47.0	35	80.0	11	105.0	7	130.0	5		
48.0	7	81.0	4	106.0	12	131.0	2		
49.0	12	82.0	13	107.0	13	132.0	6		
50.0	4	83.0	7	108.0	14	133.0	9		
51.0	3	84.0	4	109.0	8	134.0	5		
53.0	2	85.0	15	110.0	12	135.0	2		
59.0	1	86.0	5	111.0	7	136.0	2		

TRIAXIAL TENSILE, STRESS AT RUPTURE, CHS=1750 IN/MIN AT 600 PSI, TP-H1011 A&B

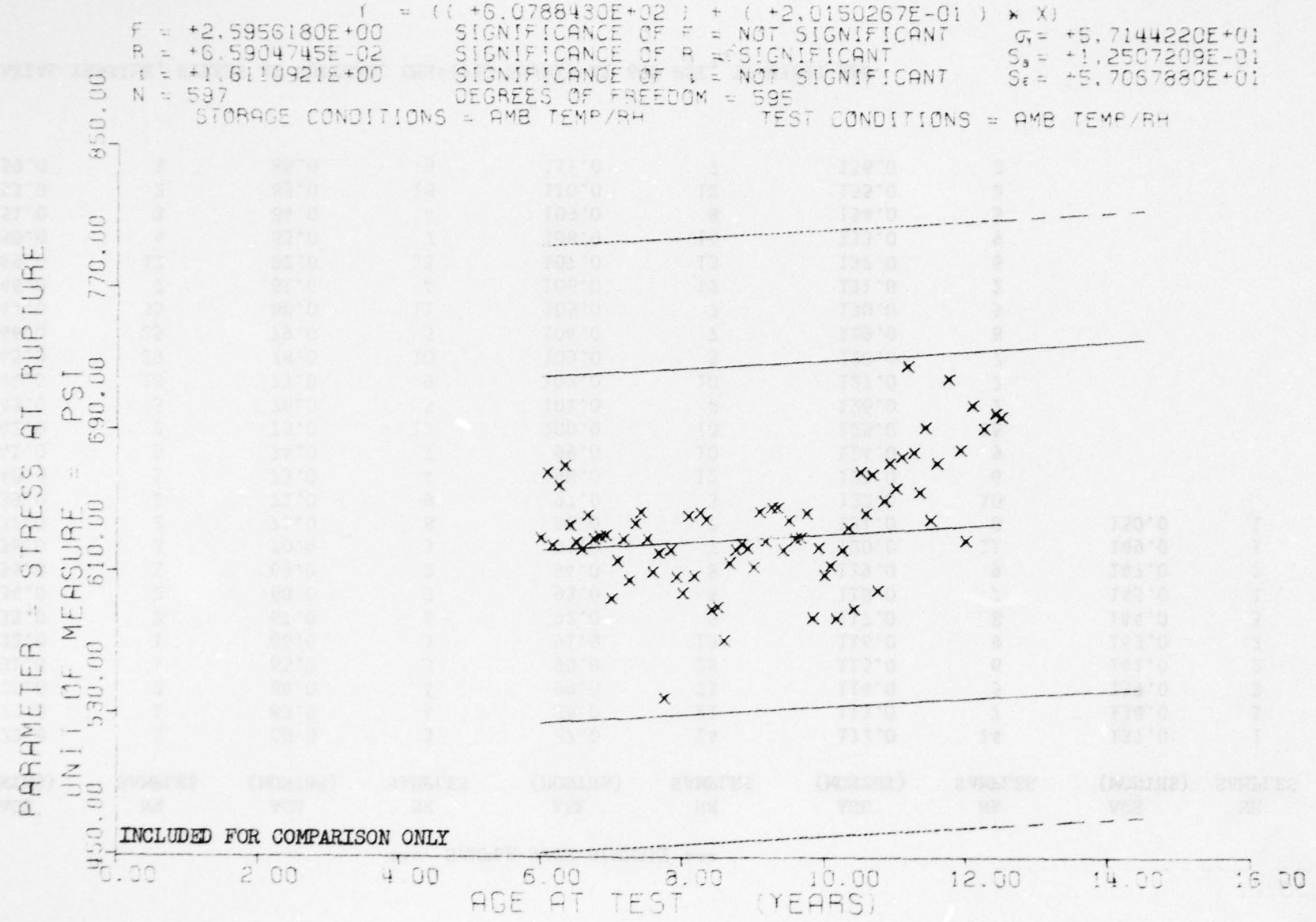

Y = ((+6.0788430E+02) + (+2.0150267E-01) * X)
F = +2.5956180E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT σ₁ = +5.7144220E+01
R = +6.5904745E-02 SIGNIFICANCE OF R = SIGNIFICANT S₃ = +1.2507209E-01
t = +1.6110921E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε = +5.7067880E+01
N = 597 DEGREES OF FREEDOM = 595
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
450.00
530.00
610.00
690.00
770.00
850.00
INCLUDED FOR COMPARISON ONLY
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
TRIAXIAL TENSILE,STRESS AT RUPTURE,CHS=1750 IN/MIN AT 600 PSI,TP-H1011 A&B

Figure 24A

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
72.0	21	97.0	26	122.0	36
73.0	24	98.0	24	123.0	24
74.0	12	99.0	20	124.0	9
75.0	13	100.0	15	125.0	24
76.0	9	101.0	18	126.0	18
77.0	45	102.0	18	127.0	29
78.0	18	103.0	20	128.0	9
79.0	36	104.0	42	129.0	18
80.0	27	105.0	27	130.0	9
81.0	21	106.0	33	131.0	12
82.0	63	107.0	18	132.0	24
83.0	24	108.0	18	133.0	18
84.0	39	109.0	23	134.0	14
85.0	22	110.0	30	135.0	30
86.0	18	111.0	52	136.0	31
87.0	69	112.0	20	137.0	12
88.0	101	113.0	48	138.0	16
89.0	75	114.0	26	139.0	18
90.0	85	115.0	18	140.0	12
91.0	66	116.0	35	141.0	11
92.0	96	117.0	25	142.0	6
93.0	49	118.0	16	143.0	9
94.0	60	119.0	41	144.0	12
95.0	42	120.0	42		
96.0	30	121.0	18		

TRIAXIAL TENSILE STRESS AT RUPTURE,CHS=1750.0 IN/MIN,TP-H1011 A&B PROPELLENT